



MAXIMUM SPANS
FOR JOISTS AND
RAFTERS



VOLIVICH 4

FOREWORD

The tables in this chapter provide a means for readily ascertaining the maximum safe spans for joists and rafters under the uniform live loads ordinarily encountered in buildings and for the usual working stress, joist size, and spacing combinations. All span lengths given in the tables are for dressed lumber sizes as given on page 27 in the table of properties of American Standard Sizes for dimension lumber and timber.

To determine the maximum safe span for a joist, first ascertain the allowable working stress for the species and grade of lumber used by referring to the local building code or to Chapter VII of this series, Working Stresses for Structural Timber. Then in the table for the live load to be supported and reading across from the size of joist and spacing on centers used, the maximum allowable span will be found under the column headed by the allowable working stress.

Spans are given for two controlling conditions, one being so limited that deflection under the calculated load will not exceed 1/360 of the span length and the other determined by the bending strength of the piece. The deflection should be limited to prevent cracks where ceilings are covered with some hard, inelastic material such as plaster. Where ceilings are not so covered and a small amount of deflection is not objectionable, the span length may be determined by the bending strength or by the allowable horizontal shear stress (whichever governs) instead of by the stiffness of the member.

When the tables are used to determine the span lengths under heavier loads, the reader is cautioned to note that spans given for bending and deflection must be checked against those limited by horizontal shear for the particular load involved. Thus for a live load of 100 lbs. per sq. ft., it is essential to find both the span length limited by the horizontal shear stress and by the allowable stress in extreme fibre and use the shortest of the two. This is necessary as a joist might be of adequate size to support the load so far as its bending strength is concerned, but might fail because it had a greater span than justified by the allowable horizontal shear stress permitted, or, conversely, if the span was selected based on the allowable shear it might be greater than that permitted for bending. The ratio of extreme fibre stress to horizontal shear is not constant for all species, some having a relatively high extreme fibre stress in bending with a comparatively low horizontal shear stress, while for others the ratio is much different. Also, when designing for stiffness, that is to limit the deflection of the joist, it is necessary to check the deflection, bending, and shear spans and use the shortest of the three.

On page 27 appears a table of properties of American Standard Sizes of dimension lumber and timber. This data is supplementary to the table and is provided for use in conjunction with the usual formulas employed in designing structural members of wood.

The information in this chapter being adapted to American Standard Sizes of dressed lumber will, it is hoped, be of timely, practical service and convenience to building officials, architects, engineers, contractors and builders and those using lumber in building.

There is obtainable from the National Lumber Manufacturers Association information relating to working stresses, grades, and qualities of structural material which is useful both as general information and in conjunction with building codes. The data appearing in this chapter prepared under the direction of Richard G. Kimbell are issued under the authority and responsibility of the National Lumber Manufacturers Association.

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FLOOR JOIST SPANS (30 Pound Load)

| | | | | | FLOO | R JOIS | T SPAN | NS (30) | Pound I | load) | | | | |
|---------------------------------------|--------------|--|---|-------------------------------------|-------------------------|-------------------------|---|-------------------------|---------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---|
| | | extreme to the | f=1,800 | Ft. Ins. 14— 8 12—10 10— 6 | 19— 5 17— 0 14— 0 | 24— 4 21— 4 17— 8 | 29— 3 25— 8 21— 3 | 29—10 24— 9 | 18— 4 16— 1 13— 3 | 24— 2 21— 2 17— 6 | 30— 0 26— 6 22— 1 | 26— 6 | 12 | or |
| eiling. | | 1 the allowable extreme lumber used, refer to the | f=1,700 | Ft. Ins. 14— 3 12— 5 10— 2 | 18—10 16— 6 13— 7 | 23— 8 20— 9 17— 1 | 28— 5 24—11 20— 8 | 29— 0 24— 1 | 17—10 15— 8 12—11 | 23— 5 20— 7 17— 1 | 29— 3 25— 9 21— 5 | 25— 9 | 30— 0 | |
| stered Ce | | . 4 | f=1,600 | Ft. Ins. 13—10 12— 1 10— 0 | 18— 4 16— 0 13— 3 | 23— 0 20— 1 16— 7 | 27— 7 24— 3 20— 0 | 28— 1 23— 4 | 17— 4 15— 2 12— 6 | 22— 9 20— 0 16— 7 | 28— 5 25— 0 20—10 | 30—0 | 29— 1 | pounds per per square f with ceiling inplastered. |
| with Unplastered Ceiling. | | ending the table on page 1 species and grade of 1 maximum safe span. | f=1,500 | Ft. Ins. 13—5 11—8 9—7 | 17— 9 15— 6 12— 9 | 22— 3 19— 6 16— 1 | 26— 8 23— 5 19— 5 | 30— 0 27— 3 22— 7 | 16— 9 14— 8 12— 1 | 22— 0 19— 4 16— 0 | 27— 6 24— 3 20— 2 | 29— 0 24— 2 | 28— 2 | plaster ceiling (10 pounds per square foor flooring (5 pounds per square foot). e foot of floor area with ceiling plastered, e foot with ceiling unplastered. |
| poo, | (Clear Span) | by Bending de or the table or the species an mine maximum | f=1,400 | Ft. Ins. 13— 0 11— 3 9— 4 | 17— 2 15— 0 12— 4 | 21— 6 18—10 15— 7 | 25— 9 22— 8 18— 9 | 29—10 26—4 21—10 | 16-2 14-2 11-7 | 21— 3 18— 8 15— 6 | 26— 7 23— 5 19— 5 | 28— 0 | 27— 3 | nd plaster of flooring lare foot of |
| LY LOADED per Square F | SUPPORTS (| Determined by Bending e building code or the table or square inch for the species and value to determine maximum sa | f=1,300 | Ft. Ins. 12—6 10—10 9— 0 | 16— 6 14— 5 11—11 | 20— 8 18— 2 15— 0 | 24—10 21—10 18— 1 | 28— 9 25— 3 21— 0 | 15-7 13-8 11-3 | 20— 6 18— 0 14—11 | 25— 7 22— 7 18— 9 | 30— 0 27— 0 22— 6 | 26— 3 | Weight of joist. Weight of lath and pl. Double thickness of flo 30 pounds per square f |
| IFORM Pounds | BETWEEN SU | | f=1,200 | Ft. Ins. 12— 0 10— 6 8— 7 | 15—11 13—11 11—5 | 19—11 17— 4 14— 5 | 23—11 20—11 17— 5 | 27— 8 24— 4 20— 3 | 15 - 0 $13 - 1$ $10 - 10$ | 19— 8 17— 4 14— 4 | 24— 7 21— 8 18— 0 | 29—4 25—11 21—8 | 30— 0 25— 2 | |
| JOISTS-UN Live Load 40 | LENGTHS BE | aving determined by reference to th fibre stress in bending in pounds per column below with the corresponding | f=1,100 | Ft. Ins. 11—6 10— 0 8— 3 | 15— 3 13— 4 10—11 | 19— 1 16— 8 13—10 | 22—11 20—1 16—7 | 26— 6 23— 4 19— 4 | 14— 4 12— 6 10— 4 | 18—10 16—7 13—9 | 23— 6 20— 9 17— 3 | 28— 1 24—10 20— 9 | 28—10 24— 3 | Dead load |
|)R | ALLOWABLE LE | determined stress in ber n below wit | f=1,000 | Ft. Ins. 10—11 9—6 7—10 | 14— 6 12— 8 10— 5 | 18—3 15—11 13—3 | $\begin{array}{c} 21 - 10 \\ 19 - 3 \\ 15 - 10 \end{array}$ | 25— 3 22— 3 18— 6 | 13— 8 12— 0 9—11 | 17—11 15— 9 13— 1 | 22— 5 19— 9 16— 5 | 26— 9 23— 8 19— 9 | 30— 0 27— 6 23— 0 | |
| N O | UM | Having fibre s | f=900 | Ft. Ins. 10— 4 9— 1 7— 5 | 13— 9 12— 0 9—11 | 17—3 15—1 12—6 | 20— 8 18— 1 15— 0 | 24— 0 21— 0 17— 6 | 13-0 11-4 9-4 | 17— 1 15— 0 12— 5 | 21— 3 18— 9 15— 7 | 25— 5 18— 9 | 29— 5 26— 1 21— 8 | tth. |
| XIMUM SPANS FO Foot with Plastered | MAXIM | of the Span to the build- the allowable ls per square used, refer to corresponding | E=1,000,000 E=1,200,000 E=1,400,000 E=1,600,000 | Ft. Ins. 10— 8 9— 9 8— 6 | 14— 0 12—11 11— 4 | 17— 9 16— 3 14— 4 | 21— 4 19— 6 17— 3 | 24— 9 22— 9 20— 2 | 12— 4 11— 4 10— 0 | 16— 4 14—11 13— 2 | 20— 5 18— 9 16— 8 | 24— 5 22— 7 19—11 | 28— 6 26— 4 23— 4 | lengths are based on: When limited by deflection— Maximum allowable deflection of 1/360 of span length. Modulus of elasticity as noted for "E." When determined by bending strength of the piece— Allowable stress in extreme fibre in bending as noted i |
| MAXIMUM Square Foot wit | | of 1/360 of treference to in page 1 the in pounds ratificity timber used in the correspondence on the correspondence of the correspo | E=1,400,000 | Ft. Ins. 10— 2 9— 3 8— 2 | 13— 6 12— 4 10—10 | 17— 0 15— 6 13— 8 | 20— 5 18— 8 16— 6 | 23— 9 21— 9 19— 4 | 11-10 $10-10$ $9-6$ | 15-7 14-4 12-8 | 19—6 17—11 15—11 | 23— 5 21— 7 19— 2 | 27— 3 25— 2 22— 4 | tion of 1/360 1 for "E." strength of t |
| | | Limited by Deflection of 1/360 of the Span Having determined by reference to the building code or the table on page I the allowable modulus of elasticity in pounds per square inch for the species of timber used, refer to the column below with the corresponding value to determine span. | E=1,200,000 | Ft. Ins. 9—9 8—11 7—9 | 12—10 11— 9 10— 3 | 16—1 14—10 13— 0 | 19— 5 17—10 15— 8 | 22— 7 20— 9 18— 4 | 11 - 2 $10 - 2$ $9 - 0$ | 14—10 13— 8 12— 0 | 18-7 17-0 15-1 | 22— 3 20— 6 18— 2 | 25—11 23—10 21— 3 | ed on: deflection— lowable defle icity as notee I by bending ress in extre |
| Live Load 30 Pounds per | | Limited he Having det ing code modulus inch for the colur the colur value to | E=1,000,000 | Ft. Ins. 9—188—47—3 | 12-0 11-0 9-8 | 15—2 13—11 12—2 | 18— 3 16— 9 14— 9 | 21— 3 19— 6 17— 3 | 10— 6 9— 7 8— 6 | 13—11 12—10 11—3 | 17— 6 16— 0 13— 2 | 20—11 19— 4 17— 1 | 23— 4 22— 6 20— 0 | -The lengths are based When limited by d Maximum allo Modulus of elastic: When determined Allowable stre |
| Live Loa | | Spacing of Joists Center to Center in Inches | | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | NOTE.—The len Who Mod Whod |
| | | Size of Joists (Nominal) in Inches | | 2 x 6 | 23 x 8 | 2 x 10 | 2 x 12 | 2 x 14 | 3 x 6 | 23 X SS | 3 x 10 | 3 x 12 | 3 x 14 | NO |

FLOOR JOIST SPANS (40 Pound Load)

Live Load 40 Pounds per Square Foot with Plastered Ceiling. Live Load 50 Pounds per Square Foot with Unplastered Ceiling. MAXIMUM SPANS FOR FLOOR JOISTS-UNIFORMLY LOADED

| | | | Sport sport stage | DESTRUCTION OF TAXABLE | | | | | 11 | | | | | | |
|---|--|---|---|---|--|---------------------------|--|--|--------------------------------|---|---|--|---|--|-------------------------|
| | | | | | MAX | XIMUM AL | ALLOWABLE | LENGTHS | BETWEEN | N SUPPORTS | TS (Clear | Span) | | | |
| Size of Joists (Nominal) in Inches | Spacing of Joists Center to Center in Inches | | Limited by Deflection of aving determined by refusing code or the table on modulus of elasticity in inch for the species of the column below with the column below walve to determine span. | Limited by Deflection of 1/360 of the Span Having determined by reference to the building code or the table on page 1 the allowable modulus of elasticity in pounds per square inch for the species of timber used, refer to the column below with the corresponding value to determine span. | the Span the build- te allowable per square d, refer to responding | Having fibre colum | determir stress in n below | | | Determined by e building code square inch for value to determ | rmined by Bending ding code or the inch for the speci to determine maxin | table on es and gr mum safe | page 1 the ade of lumb span. | 1 the allowable es lumber used, refer | extreme fer to the |
| | | E=1,000,000 | | E=1,200,000 E=1,400,000 | E=1,600,000 | f=900 | f=1,000 | f=1,100 | f=1,200 | f=1,300 | f=1,400 | f=1,500 | f=1,600 | f=1,700 | f=1,800 |
| 2 x 6 | 12 16 24 | Ft. Ins. 8— 6 7— 9 6—10 | Ft. Ins. 9—1 8—3 7—3 | Ft. Ins. 9—688—87—7 | Ft. Ins. 10— 0 9— 1 8— 0 | Ft. Ins. 9—6 8—9 6—9 | Ft. Ins. 10— 0 8— 8 7— 1 | Ft. Ins. 10—5 9—1 7—6 | Ft. Ins. 10—11 9—6 7—10 | Ft. Ins. 11—4 9—10 8— 1 | Ft. Ins. 11—10 10—3 8—5 | Ft. Ins. 12— 2 10— 8 8— 9 | Ft. Ins. 12— 7 11— 0 9— 0 | Ft. Ins. 13— 0 11— 4 9— 3 | Ft. Ins. 13—5 111—7 9—6 |
| 2 x 8 | 12 16 24 | 11-5 | 12— 0 11— 0 9— 8 | 12— 8 11— 7 10— 2 | 13— 3 12— 1 10— 8 | 12 - 6 $10 - 11$ $8 - 11$ | $ \begin{array}{c} 13 - 2 \\ 11 - 6 \\ 9 - 5 \end{array} $ | $\begin{array}{c} 13-10 \\ 12-0 \\ 9-11 \end{array}$ | 14— 5 12— 7 10— 4 | 15— 0 13— 1 10— 9 | 15— 7 13— 8 11— 2 | 16 - 1 $14 - 1$ $11 - 7$ | 16— 8 14— 6 12— 0 | 17— 2 15— 0 12— 4 | 17— 8 15— 5 12— 8 |
| 2 x 10 | 12 16 24 | 14— 4 13— 1 11— 6 | $\begin{array}{c} 15 - 2 \\ 13 - 10 \\ 12 - 2 \end{array}$ | $ \begin{array}{c} 16 - 0 \\ 14 - 7 \\ 12 - 10 \end{array} $ | 16— 8 15— 3 13— 5 | 15— 9 13— 9 11— 4 | 16— 7 14— 6 11—11 | 17— 4 15— 2 12— 6 | 18 - 2 $15 - 10$ $13 - 1$ | 18—11 16— 6 13— 8 | 19 - 7 $17 - 1$ $14 - 1$ | 20 - 3 $17 - 9$ $14 - 7$ | 21 - 0 $18 - 4$ $15 - 1$ | 21— 8 18—10 15— 7 | 22— 3 19— 5 16— 0 |
| 2 x 12 | 12 16 24 | 17— 3 15— 9 13—10 | 18— 3 16— 9 14— 9 | 19— 3 17— 7 15— 6 | 20— 1 18— 5 16— 2 | 18—11 16— 6 13— 8 | 19—11 17— 5 14— 4 | 20—11 18— 3 15— 1 | 21 - 11 $19 - 1$ $15 - 9$ | 22 - 8 $19 - 11$ $16 - 5$ | 23 - 6 $20 - 7$ $17 - 0$ | 24— 5 21— 4 17— 7 | 25— 2 22— 0 18— 2 | 26— 0 22— 9 18— 9 | 26— 9 23— 5 19— 4 |
| 2 x 14 | 12 16 24 | 20— 0 18— 4 16— 3 | 21— 2 19— 6 17— 3 | 22— 6 20— 6 18— 1 | 23— 5 21— 5 18—11 | 21—11 19—3 15—11 | 23— 2 20— 3 16— 9 | 24— 3 21— 3 17— 7 | 25— 4 22— 3 18— 5 | 26— 4 23— 2 19— 2 | 27— 4 24— 0 19—10 | 28— 4 24—10 20— 7 | 29— 4 25— 8 21— 3 | 30— 0 26— 6 21—11 | 27— 3 22— 6 |
| 3 x 6 | 12 16 24 | 9—11 9—1 7—11 | 10—6 9—8 8—5 | 11— 2 10— 2 8—11 | 11—8 10—8 9—4 | 11-10 $10-4$ $8-6$ | 12— 5 10—11 8—11 | 13 - 1 $11 - 5$ $9 - 5$ | 13 - 8 $11 - 11$ $9 - 9$ | 14— 3 12— 5 10— 3 | 14 - 9 $12 - 10$ $10 - 8$ | 15— 3 13— 4 11— 0 | 15— 9 13— 9 11— 4 | 16— 3 14— 3 11— 9 | 16— 9 14— 9 12— 0 |
| ∞ × ∞ | 12 16 24 | 13— 1 12— 0 10— 8 | 13—11 12— 9 11— 3 | 14— 8 13— 5 11—10 | 15— 4 14— 0 12— 4 | 15— 7 13— 8 11— 3 | $ \begin{array}{c} 16 - 5 \\ 14 - 5 \\ 11 - 10 \end{array} $ | 17— 3 15— 1 12— 5 | 18— 0 15— 9 13— 0 | 18— 9 16— 5 13— 7 | 19 - 5 $17 - 0$ $14 - 1$ | 20— 1 17— 8 14— 7 | 20— 9 18— 3 15— 0 | 21— 5 18— 9 15— 6 | 22— 0 19— 4 15—11 |
| 3 x 10 | 12 16 24 | 16— 5 15— 1 13— 4 | 17— 6 16— 1 14— 2 | 18—5 16—11 14—11 | 19— 3 17— 8 15— 7 | 19— 6 17— 2 14— 3 | $ \begin{array}{c} 20 - 7 \\ 18 - 1 \\ 15 - 0 \end{array} $ | 21— 7 18—11 15— 9 | 22— 6 19— 9 16— 5 | 23— 3 20— 8 17— 1 | 24— 4 21— 4 17— 9 | 25— 2 22— 2 18— 4 | 26— 0 22—10 18—11 | 26— 9 23— 7 19— 6 | 27— 7 24— 3 20— 1 |
| 3 x 12 | 12 16 24 | 19— 9 18— 2 16— 1 | 20—11 19— 4 17— 1 | 22— 1 20— 4 18— 0 | 23— 1 21— 3 18— 9 | 23— 4 20— 6 17— 1 | 24— 7 21— 8 18— 0 | 25— 9 22— 9 18—10 | 26—11 23— 9 19— 9 | 28— 0 24— 8 20— 6 | 29— 1 25— 8 21— 4 | 30— 0 26— 6 22— 1 | 27— 5 | 28— 3 | 29— 1 24— 2 |
| 3 x 14 | 12 16 24 | 23— 1 21— 3 18— 9 | 24— 5 22— 6 20— 0 | 25— 9 23— 9 21— 0 | 26—11 24—10 22— 1 | 27— 0 23—11 19—11 | 28— 6 25— 2 21— 0 | 30— 0 26— 5 22— 0 | 27— 7 | 28— 9 23—11 | 29— 9 24—10 | 30— 0 | 26— 7 | 27— 5 | 28— 2 |
| Z | OTE.—The le | ngths are bas hen limited by Maximum a Modulus of hen determine Allowable si | sed on: y deflection— llowable defle elasticity as ed by bending tress in extre | ction of 1/360 noted for "E. strength of me fibre in b | NOTE.—The lengths are based on: When limited by deflection— Maximum allowable deflection of 1/360 of span length. Modulus of elasticity as noted for "E." When determined by bending strength of the piece— Allowable stress in extreme fibre in bending as noted | length. | | Dead load- Live load- | | of joist. of lath and thickness of | plaster ceil flooring (5 re foot of flare foot with | Weight of joist. Weight of lath and plaster ceiling (10 pounds per square foot). Double thickness of flooring (5 pounds per square foot). 40 pounds per square foot of floor area with plastered ceiling, of 0 pounds per square foot with ceiling unplastered. | nds per squ square foo th plastered | are foot). t). ceiling, or | |
| | | | | | | | | | | | | | | | - |

pounds per square foot).
per square foot).
with plastered ceiling, or
unplastered.

ight of joist.

ight of lath and plaster ceiling (10) lubb thickness of flooring (5 pounds) pounds per square foot of floor area pounds per square foot with ceiling

Weight o Weight o Double t -50 pound 60 pound

load-

Live

46 F.

for

as noted

of span length,

When limited by deflection—
Maximum allowable deflection of 1/860 of span
Maximum ellowable deflection of 1/86.
Modulus of elasticity as noted for "F."
When determined by bending strength of the piece—
Allowable stress in extreme fibre in bending as

-The

NOTE.

load-

Dead

FLOOR JOIST SPANS (50 Pound Load)

-10 000 7017 004 -00 co co 100 910-000 Ins. f=1,800 allowable extreme 14-11-11-17 186 222 13.15 1825 27. 26 217 -11 - 6 4 15—10 13—10 11—4 000 1129 Ins. 004 098 016 -10 44 601 04 f=1,700 Unplastered Ceiling. 30 10 m 24. 26.52 24 28 24 20 lding code or the table on page 1 the a e inch for the species and grade of lumber to determine maximum safe span. 19— 5 16—11 13—11 10 -10 0101 01010 Ins. - 1 0000 100 500 f=1,600 23— 20— 16—1 111. 100. 8 4210 119 23-23-19 212 25 25 21 25 23 ____11 ___0 ___8 Ins. 000 491 000 000 1001 849 0000 00 f=1,500 11. 80 13 13-16-13 23-16-16-23 5 19 22 19 16 23-28-119-24 20 20 20 with Span) Bending Ft. Ins. 10—11 9—5 7—10 $\frac{18}{15}$ $\frac{13-8}{11-11}$ 9-10____10 _____9 -10 4004 000 000 80 10 1-4 f=1,400 Live Load 60 Pounds per Square Foot 21—1 19— 15— (Clear 25-22-18-200 12-01 19-116-116-23-19-23 -UNIFORMLY LOADED by Determined building constant for square inch for value to deter 000 SUPPORTS Ins. 4019 -10 0000 0100 010 0000 100 f=1,300 100 t 15-17 18-15-113 157 22 22 19 122-9 24 21 17-13. 26.22 the Ins. -111 - 4 - 2 000 184 100 000 400 2001 910 Having determined by reference to th fibre stress in bending in pounds per column below with the corresponding f=1,200 BETWEEN 16—1 12—1 12—1 12-11-9-23— 20— 17— 16— 14— 12— 10-10-7-20-18-15-25 25 18 255 10 - 6 19— 4 16—11 13—11 Ins. - 4 099 019 000 000 9000 198 009 f=1,100 LENGTHS 16 14 11 11 20— 17— 14— 16— 14— 11— JOISTS 6 8 9: 112-6 100 24. 24 20 20 Ins. . . 3 10 110 000 240 500 440 10014 900 01000 f=1,000 ALLOWABLE 12 10 8 8 SPANS FOR FLOOR Ft. 6 8 9 110-8 13-136-13 18-15-22-20-116-13-13 23 23 19 Square Foot with Plastered Ceiling. 10-11 9-6 7-10-10 20 - 4 17 - 10 14 - 8Ins. 9 2000 CH0 C10010 100 200 f=900 111-8 470 15-11 135 19-15-4210 1825 MAXIMUM rmined by reference to the build-r the table on page 1 the allowable f elasticity in pounds per square he species of timber used, refer to n below with the corresponding etermine span. E=1,600,000 18 - 4 16 - 10 14 - 10 $\begin{array}{c} 22 - 0 \\ 20 - 3 \\ 17 - 10 \end{array}$ 15-10 14-7 12-9000 000 4100 C 40 1919 104 Ins. 7 19-17-15-22-20-18-1101 101 101 101 14— 13— 11— Ft. 99-223 MAXIMUM E=1,400,000 Jo $\frac{15}{13}$ 000 044 Ins. 000 000 498 200 MAN 141 of 1/360 17— 16— 14— $\frac{21}{19}$ 14— 12— 11— 1000L 19-17-01000 222 Taving determined by reing code or the table on modulus of elasticity if in for the species with column below with value to determine spa Deflection E=1,200,000 1122 Ft. Ins. 7 8—7 7—10 6—10 1000 1001 000 809 810 00 H 00 00 00 10 048 per 13-668 1012 132 23 Pounds Limited E=1,000,000 -10 112 0000 -11--11-1910 670 9101 149 -100 000 Ins. 20 112 127 20. 134 122 117-115 000 Load Spacing of Joists Center to Center in Inches Live 12 16 24 12 16 24 16 17 24 24 12 12 24 12 16 24 16 17 24 24 16 24 24 12 12 24 24 127 127 Size of Joists (Nominal) in Inches x 10 9 ∞ x 12 9 00 3 x 10 3 x 12 3 x 14 × 3 X 2x2 ×

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FLOOR JOIST SPANS (60 Pound Load)

| State Compare Particular Particular | | | | | | MAXI | XIMUM ALLO | ALLOWABLE LI | LENGTHS BE | BETWEEN SU | SUPPORTS (| (Clear Span) | 0 | | | |
|---|-----------|----------------|--|---|--|---|--------------------------|---|-----------------------------|----------------------------|--|---|--|--|---|------------------|
| 2 x 6 1 1 | | | H | ed by Deflectic determined by ode or the table or the species or the species olumn below to determine | on of 1/360 or y reference to page 1 the pounds of timber us with the co span. | f the Span o the build- he allowable per square sed, refer to | Having fibre colur | g determine stress in b mn below wi | d by refere ending in po | nce to the cunds per sc | Determined building contained inches | by Bendin, ode or the for the spec | g table on p ies and grac mum safe sp | age 1 the le of lumber an, | allowable er | xtreme to the |
| 2 x 12 | , c1 X | 12 16 | E=1,000,00 Ft. Ins. 7—9 7—0 | Ft. Ins. 8—2 7—6 | Pt. Ins. 8—8 7—11 | Ft. Ins. 9—0 8—3 | # F. W. F. R. | 11, | - | | | 1, | f=1,500 Ft. Ins. 10— 6 9— 1 | H | | - |
| No. 1 1 1 1 1 1 1 1 1 | 23 X | 12 16 24 | | | | | | 1171 | | 1111 | | | 3 1 | 1111 | 2 -1 | 111 |
| X | x 1 | 12 16 24 | 171 | 111 | 111 | | 171 | 111 | 0 3 21 | 1111 | 1111 | 6-1 | 227 | 1111 | 111 | 1111 |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | X 1 | 12 16 24 | 111 | 111 | 111 | 111 | 6-1 | 1111 | 1111 | 111 | 1111 | 1111 | 1111 | 111 | 1111 | 1111 |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | x 1 | 12 16 24 | 111 | 111 | 111 | 1111 | 0000 | 111 | 1111 | 111 | 111 | | 1111 | 1111 | 1177 | 111 |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | × | 12 16 24 | 111 | 111 | 1111 | 111 | 0 - 1 | TII | | 1711 | 111 | | 1111 | 111 | 1111 | 1 1 1 |
| X | × | 12 16 24 | 771 | 1111 | 1111 | | 171 | 1111 | | 1111 | 111 | 111 | 1111 | 1111 | 0000 | 1 9 8 |
| X | × | 12 16 24 | 111 | TIT | 711 | 1111 | 171 | 717 | | 1111 | 1171 | 1111 | | 171 | 111 | 1111 |
| X | × | 12 16 24 | 1111 | 111 | 1111 | 111 | | 1171 | | 1111 | 1111 | 1111 | 1111 | 1171 | 1111 | 1717 |
| x 6 12 9-11 10-7 11-1 11-7 11-11 12-6 13-3 13-9 14-1 15-1 16-5 15-1 16-5 15-1 16-5 15-1 16-5 15-1 16-5 15-1 16-5 15-1 16-5 15-1 16-5 15-1 16-5 15-1 16-5 15-1 16-5 15-1 16-5 15-1 16-5 15-1 16-5 15-1 16-5 15-1 16-5 15-1 16-5 </td <td>×</td> <td>12 16 24</td> <td>111</td> <td>111</td> <td>111</td> <td>1111</td> <td></td> <td>171</td> <td>1111</td> <td>1117</td> <td>1117</td> <td>1111</td> <td>171</td> <td></td> <td>111</td> <td>1</td> | × | 12 16 24 | 111 | 111 | 111 | 1111 | | 171 | 1111 | 1117 | 1117 | 1111 | 171 | | 111 | 1 |
| 12 13 | × | 12 16 24 | 711 | 111 | 111 | 1111 | 111 | 1111 | 1111 | 111 | 1111 | 111 | 1111 | | 111 | 1-11 |
| 12 16 17 18 17 18 19 17 18 19 17 18 19 17 18 19 17 18 19 19 19 19 19 19 19 | × | 12 16 24 | 111 | 171 | | 111 | 1111 | 1111 | 1111 | 1171 | 111 | 1111 | 1111 | 1111 | 111 | 111 |
| —The lengths are based on: When limited by deflection— When limited by deflection— Maximum allowable deflection of 1/860 of span length. Modulus of elasticity as noted for "E." When limited by deflection of 1/860 of span length. Modulus of elasticity as noted for "f." When limited by deflection of 1/860 of span length. Live load—Weight of loist. Weight of lath and plaster ceiling (10 pounds per square foot). Double thickness of flooring (5 pounds per square foot). Live load—60 pounds per square foot of floor area with plastered ceiling, or Allowable stress in extreme fibre in bending as noted for "f." | × | 12 16 24 | 1111 | 1111 | 1111 | 1171 | 1111 | 1111 | 1117 | 171 | 1111 | 111 | 1111 | | | 1711 |
| | ON | -The | gths are band in limited by Maximum a Modulus of a determine Allowable s | sed on: y deflection— llowable defleelasticity as d by bending tress in extre | ction of 1/36 noted for "E strength of me fibre in b | 1 0 | | | | | ht of joist. ht of lath is le thickness unds per squands per squan | and plaster of flooring uare foot o | ceiling (10 (5 pounds f floor area vith ceiling | pounds per per square ; with plaster unplastered. | square foot foot). red ceiling, c | |

FLOOR JOIST SPANS (70 Pound Load)

| | | | | | | LLOOF | 1 1018 | ST SPA | 1115 (| 10 Fot | ind Lo | au) | | | 1 | | |
|---------------------------------------|--------------|---|---|--------------------------|---|--|--|--|--|---------------------------|--------------------------|---------------------------|--|--|-------------------------|--------------------------|---|
| | | extreme r to the | | Ft. Ins. 10— 9 9— 5 7— 9 | | 1.17 | 111 | 111 | $\frac{13-7}{11-11}$ | 18— 0 15— 9 13— 0 | 22— 9 19—10 16— 4 | 27— 3 23—11 19— 9 | 27—10 23— 0 | 15—11 13—11 11— 5 | 21— 0 18— 5 15— 3 | 26— 4 23— 1 19— 1 | or |
| Ceiling. | | allowable rused, refer | - | Ft. Ins. 10— 6 9— 2 7— 6 | 111 | 111 | 111 | 24 - 9 $21 - 7$ $17 - 10$ | 13— 4 11— 7 9— 6 | 17— 6 15— 4 12— 7 | 22— 0 19— 4 15—11 | 26— 5 23— 3 19— 3 | 30— 0 27— 0 22— 5 | 15— 6 13— 6 11— 1 | 20— 5 17—11 14— 9 | 25— 7 22— 5 18— 6 | square foofoot). |
| | | age 1 the e of lumber | - | Ft. Ins. 10— 2 8—10 7— 4 | 13 - 7 $11 - 9$ $9 - 8$ | 171 | 171 | 24— 0 21— 0 17— 4 | 12—11 11— 3 9— 3 | 17 - 0 $14 - 10$ $12 - 3$ | 21 - 5 $18 - 9$ $15 - 5$ | 25— 9 22— 6 18— 7 | 29—11 26— 3 21— 9 | 15 - 0 $13 - 1$ $10 - 10$ | 19—10 17— 4 14— 4 | 24-10 $21-10$ $18-0$ | pounds per square foo per square foot), with plastered ceiling, unplastered. |
| D Foot with Unplastered | | table on pees and grad | | Ft. Ins. 9—10 8—7 7—1 | 13— 2 11— 5 9— 5 | 16— 6 14— 5 11— 9 | 711 | 23— 3 20— 4 16— 9 | 12— 5 10—11 8—11 | 16— 6 14— 5 11—10 | 20— 9 18— 1 14—11 | 24-10 $21-10$ $18-0$ | 28—11 25— 5 21— 0 | 14— 6 12— 9 10— 5 | 19— 3 16—10 13—10 | 24 - 0 $21 - 1$ $17 - 5$ | ceiling (10 (5 pounds 1 floor area |
| ED e Foot w | (Clear Span) | by Bending de or the or the speci | f=1,400 | Ft. Ins. 9—6 8—4 6—10 | $\frac{12-7}{11-0}$ | 171 | 111 | 22— 5 19— 7 16— 3 | 12 - 0 $10 - 6$ $8 - 7$ | 15—11 13—11 11—5 | 20— 0 17— 6 14— 5 | 24— 0 21— 0 17— 5 | 27—11 24— 6 20— 4 | 14— 0 12— 3 10— 1 | 18— 6 16— 3 13— 5 | 23— 3 20— 5 16—10 | nd plaster of fleoring uare foot of uare |
| LY LOADED per Square F | SUPPORTS (| Determined by Bending on page 1 the allowable extreme fibre stress in bending in pounds per square inch for the species and grade of lumber used, refer to the column below with the corresponding value to determine maximum safe span. | f=1,300 | Ft. Ins. 9—2 8—0 6—7 | 12— 2 10— 7 8— 8 | 15— 5 13— 5 11— 0 | 18— 6 16— 2 13— 4 | 21 - 7 $18 - 11$ $15 - 7$ | $ \begin{array}{c} 111 - 7 \\ 100 - 1 \\ 8 - 4 \end{array} $ | 15— 5 13— 6 11— 1 | 19—4 16—11 13—11 | 23— 1 20— 4 16— 9 | 26—11 23— 7 19— 7 | 13— 6 11—10 9— 9 | 17-10 $15-7$ $12-11$ | 22— 4 19— 7 16— 3 | Weight of joist. Weight of lath and plaster ceiling (10 pounds per square foot) Double thickness of flooring (5 pounds per square foot). 70 pounds per square foot of floor area with plastered ceiling, or 80 pounds per square foot with ceiling unplastered. |
| UNIFORMLY 80 Pounds per | BETWEEN SU | ice to the unds per sq sponding va | f=1,200 | Ft. Ins. 8—9 7—8 6—5 | 11—8 10—2 8—5 | 14 - 9 $12 - 10$ $10 - 7$ | 17 - 9 $15 - 6$ $12 - 9$ | $ \begin{array}{c} 20 - 10 \\ 18 - 3 \\ 15 - 0 \end{array} $ | $\begin{array}{c} 11 - 1 \\ 9 - 9 \\ 8 - 0 \end{array}$ | 14 - 9 $12 - 10$ $10 - 7$ | 18— 6 16— 3 13— 4 | 22— 3 19— 6 16— 1 | 25—11 22—9 18—10 | 13— 0 11— 4 9— 4 | 17— 1 15— 0 12— 5 | 21— 6 18—11 15— 7 | |
| JOISTS—UN Live Load 80 | LENGTHS BE | by referen | f=1,100 | Ft. Ins. 8—6 7—5 6—0 | $\begin{array}{c} 11 - 2 \\ 9 - 9 \\ 8 - 0 \end{array}$ | 14— 2 12— 4 10— 1 | $\begin{array}{c} 17 - 0 \\ 14 - 10 \\ 12 - 2 \end{array}$ | 19—11 17— 5 14— 4 | 10— 9 9— 4 7— 7 | 14— 1 12— 4 10— 1 | 17— 9 15— 6 12—10 | 21— 4 18— 9 15— 5 | 24-10 $21-9$ $18-0$ | 12— 5 10—11 8—11 | 16— 5 14— 5 11—10 | 20— 7 18— 1 14—11 | Dead load |
| 120 | ALLOWABLE LE | determined stress in bea n below wit | f=1,000 | Ft. Ins. 8—17—0 | 10— 8 9— 4 7— 8 | $ \begin{array}{c} 13 - 6 \\ 11 - 9 \\ 9 - 7 \end{array} $ | 16— 4 14— 2 11— 8 | $ \begin{array}{c} 19 - 0 \\ 16 - 7 \\ 13 - 7 \end{array} $ | 10 - 1 $8 - 11$ $7 - 4$ | 13— 6 11— 9 9— 7 | 16—11 14—10 12— 3 | 20— 3 17—10 14— 9 | 23— 7 20— 9 17— 3 | 11-11 $10-4$ $8-6$ | 15— 9 13— 9 11— 4 | 19— 7 17— 3 14— 3 | |
| IS FOR FLOC | MUM ALLO | Having fibre colum | 111 | Ft. Ins. 7—8 6—8 5—6 | $ \begin{array}{cccccccccccccccccccccccccccccccccccc$ | 12 - 9 $11 - 2$ $9 - 2$ | 15— 5 13— 5 11— 1 | 18— 0 15— 9 13— 0 | 9— 7 8— 5 6—11 | 12-10 $11-1$ $9-3$ | 16— 0 14— 0 11— 7 | 19— 3 16—11 13—11 | 22— 5 19— 9 16— 4 | $ \begin{array}{c} 11-3 \\ 9-10 \\ 8-1 \end{array} $ | 14—10 13— 0 10— 9 | 18— 7 16— 4 13— 6 | ength. |
| M SPANS | MAXIM | of the Span to the build- the allowable ls per square used, refer to corresponding | E=1,600,000 | Ft. Ins. 8—7 7—10 6—10 | 11 - 6 $10 - 6$ $9 - 2$ | 14— 6 13— 2 11— 7 | 17 - 6 $16 - 0$ $14 - 0$ | 20— 6 18—10 16— 6 | 10— 1 9— 3 8— 1 | 13— 5 12— 3 10—10 | 16—11 15— 5 13— 7 | 20— 5 18— 7 16— 5 | 23 - 9 $21 - 10$ $19 - 3$ | 11— 3 10— 3 9— 0 | 14—10 13— 7 12— 0 | 18— 7 17— 1 15— 1 | of span len te piece— nding as no |
| MAXIMUM SPAN Square Foot with Plas | | of 1/360 of the Span reference to the build-on page I the allowable y in pounds per square of timber used, refer to with the corresponding span. | 3=1,400,000 | Ft. Ins. 8— 2 7— 6 6— 7 | $\begin{array}{c} 11-0\\ 10-0\\ 8-9 \end{array}$ | $\begin{array}{c} 13-10 \\ 12-8 \\ 11-1 \end{array}$ | 16— 8 15— 4 13— 5 | 19 - 7 $17 - 11$ $15 - 10$ | 9— 9 8—10 7— 9 | 12—10 11— 9 10— 4 | 16— 3 14—10 13— 0 | 19 - 5 $17 - 10$ $15 - 9$ | 22— 7 20—11 18— 5 | 10 - 9 $9 - 10$ $8 - 7$ | 14— 3 13— 0 11— 5 | 17-10 $16-5$ $14-5$ | ion of 1/360 oted for "E." trength of the e fibre in be |
| per | | Limited by Deflection of 1/360 of the Span Having determined by reference to the building code or the table on page I the allowable modulus of elasticity in pounds per square inch for the species of timber used, refer to the column below with the corresponding value to determine span. | E=1,200,000 1 | Ft. Ins. 7—9 7—1 6—2 | 10— 5 9— 6 8— 4 | 13— 1 12— 0 10— 6 | 15—10 14— 6 12— 8 | 18— 7 17— 0 15— 0 | 789 | 12— 3 11— 1 9—10 | 15— 5 14— 0 12— 4 | 18— 6 16—11 14—11 | $\begin{array}{c} 21 - 7 \\ 19 - 10 \\ 17 - 6 \end{array}$ | 10— 3 9— 4 8— 1 | 13— 6 12— 4 10—10 | 16—11 15— 6 13— 9 | deflection— wable deflect asticity as ne by bending sess in extrem |
| d 70 Pounds | | Limited b Having deting code ing code inch for the colur | $\mathbf{E} = 1,000,000 \mathbf{E} = 1,200,000 \mathbf{E} = 1,400,000 \mathbf{E} = 1,600,000$ | Ft. Ins. 6—8 6—8 5—10 | 9-9 8-10 7-9 | 12— 5 11— 4 9—10 | 15— 0 13— 8 12— 0 | 17— 6 16— 1 14— 1 | 8-7 7-11 6-11 | 11— 6 10— 6 9— 3 | 14— 6 13— 3 11— 7 | 17— 5 15—11 14— 0 | 20— 4 18— 7 16— 5 | 9-7 8-9 7-9 | 12— 9 11— 7 10— 3 | 15—11 14— 7 12—11 | The lengths are based on: When limited by deflection— Maximum allowable deflection of 1/360 of span length, Modulas of elasticity as noted for "E.". When determined by bending strength of the piece— Allowable stress in extreme fibre in bending as noted |
| Live Load | | Spacing of Joists Center to Center in Inches | 10 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | .—The |
| | | Size of Joists (Nominal) in Inches | | 2 x 6 | 2 x 8 | 2 x 10 | 2 x 12 | 2 x 14 | 3 x 6 | 3 x 8 | 3 x 10 | 3 x 12 | 3 x 14 | 4 x 6 | 4 x 8 | 4 x 10 | NOTE |

FLOOR JOIST SPANS (80 Pound Load)

| | 11 | | 1 | | | FLC | or J | OIST | SPAN | S (80 | Pound | Load) | | | | | |
|------------------------------------|--------------|---|-------------------------|---------------|------------------------|--------------------------|-------------------------|-------------------------|------------------------|------------------------|-------------------------|-------------------------|-------------------------|-----------------------|-------------------------|-------------------------|---|
| 1 | | extreme fibre to the column h of the joist. | f=1,800 | Ft. Ins. | 13 7 7 111 | 111 | | 1111 | 17—4 | 9-4 | | | 30-0 | 171 | 177 | 1111 | 18-11 |
| eiling. | 0 | allowable extreme sed, refer to the cc g strength of the of the joist limit | f=1,700 | Ft. Ins. | 13 – 2 11 – 2 | 1111 | $\frac{11-10}{20-1}$ | 111 | | 16-7 | 771 | 111 | 18 - 3 29 - 4 | | | 0 4 4 | · L |
| D Foot with Unplastered Ceiling | | 0 4 6 2 | f=1,600 | In | 8— 5 12— 9 11— 1 | 111 | 111 | 177 | 16-5 | 111 | 1111 | 24- 5 21- 5 | 111 | 20-7 14-3 12-5 | 171 | 0 6 | ds per so |
| with Unpl | 1) | | f=1,500 | Ft. Ins. 9— 4 | 8— 1 12— 5 10— 9 | 111 | 1171 | 1111 | 7171 | 8— 5 15— 7 13— 7 | 11— 3 19— 7 17— 3 | 111 | 1111 | 771 | 9—11 18— 3 15—11 | 1171 | (10 inds area ling |
| DED re Foot v | (Clear Span) | Bending (Read ode or the table the species and g the span limit ame manner det | f=1,400 | Ft. Ins. 9—0 | 7— 9 12— 0 10— 5 | 8— 6 15— 1 13— 2 | 117 | 13— 1 21— 4 18— 7 | 15— 4 11— 5 9—11 | | 10—10 19— 0 16— 7 | 1171 | 26— 7 23— 4 | 111 | | 22-0 19-4 | and plaster ceiling s of flooring flooring (5 pour quare foot of flooring classes) |
| LY LOADED per Square F | SUPPORTS | Determined by Bend the building code or uare inch for the speur to determine the 9 and in the same 1 er of the two spans, | f=1,300 | Ft. Ins. 8—8 | $\frac{7-6}{11-6}$ | 1111 | 111 | | $\frac{14-10}{9-7}$ | 7—11 14— 9 12—10 | 18— 4 16— 0 | 111 | | 12—10 11—3 | 16—11 14—10 | 1111 | joist. lath ckness per s |
| UNIFORMLY 90 Pounds per | BETWEEN S | pans ce to ser sq g vali page short | f=1,200 | Ft. Ins. 8—4 | $\frac{7-2}{11-1}$ | | 1171 | 111 | 14— 1 10— 7 9— 3 | 1111 | 111 | 111 | | 12-4 | | 20— 5 17—11 14—10 | load—Weight Weight Double load—80 pour |
| STS_ Load | LENGTHS B | S d by reference in pounds r corresponding the table on and use the | 1-1 | Ft. Ins. 8— 0 | | 1111 | 1111 | 11— 7 18—11 16— 6 | 10— 1 8—10 | | 16—10 14— 9 | 20-3 | | | | 1111 | Dead |
| OR J | ALLOWABLE L | determine in bendin with the refer to | 1 | Ft. Ins. | 10-1 | | | 111 | | | | | | 1171 | 711 | 1111 | |
| FOR red C | IUM | H | f=9 | Ft. Ins. | 9 6 8 6 | | | 117 | 117 | | 111 | 1111 | 1111 | 1111 | 14— 1 12— 4 10— 1 | 17— 9 15— 6 12—10 | gth. |
| MAXIMUM SPANS FO | MAXIM | of the Span to the build- the allowable is per square used, refer to | E=1,600,000 | 8—4 | 111 | | 111 | 1717 | | | 1171 | 1117 | 1111 | 1771 | 14— 4 13— 1 11— 6 | 18— 0 16— 6 14— 6 | of span len te piece— nding as not |
| MAXIMU Square Foot | | y reference to y reference to o page 1 the ty in pounds p y of timber used with the corr span. | E=1,400,000 E=1,600,000 | | 10-7 | 111 | 1117 | 1111 | 1111 | 12— 5 11— 4 9—11 | 15-7 14-4 12-6 | 18—10 17— 3 15— 1 | 21—11 20— 1 17— 9 | 10— 5 9— 5 8— 4 | 13- 9 12- 6 11- 0 | 17— 4 15—10 13—11 | ion of 1/360 sted for "E." trength of the e fibre in be |
| per | | Limited by Deflection of 1/360 of the Span Having determined by reference to the building code or the table on page 1 the allowable modulus of elasticity in pounds per square inch for the species of timber used, refer to the column below with the corresponding value to determine span. | E=1,200,000 | | | 1111 | 1111 | 1111 | 111 | 11-10 10-10 9-5 | 14—10 13— 6 11—11 | 17—10 16— 4 14— 5 | 20—10 19— 1 16—10 | 9-10 9-0 7-11 | 13— 0 11—11 10— 6 | 16— 5 15— 0 13— 3 | The lengths are based on: When limited by deflection— Maximum allowable deflection of 1/360 of span length. Modulus of elasticity as noted for "E.". When determined by bending strength of the piece— Allowable stress in extreme fibre in bending as noted for |
| d 80 Pounds | | Limited h Having det ing code modulus inch for the colu | E=1,000,000 | | 1111 | 12 - 0 $10 - 10$ $9 - 7$ | 14— 5 13— 2 11— 7 | 16—11 15— 5 13— 7 | 8-4 7-7 6-9 | 11—1 10—1 8—11 | 14— 0 12—10 11— 3 | 16—10 15—5 13—6 | 19— 7 18— 0 15—10 | 9-4 7-5 | 12— 3 11— 3 9—10 | 15— 5 14— 1 12— 5 | tths are based in limited by Asximum all Modulus of elu determined Allowable str |
| Live Load | | Spacing of Joists Center to Center in Inches | | 12 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | |
| | | Size of Joists (Nominal) in Inches | | 2 x 6 | 2 x 8 | 2 x 10 | 2 x 12 | 2 x 14 | 3 x 6 | 3 x 8 | 3 x 10 | 3 x 12 | 3 x 14 | 4 x 6 | 4 x 8 | 4 x 10 | NOTE |

FLOOR JOIST SPANS (80 Pound Load)

| | | | | MAXIMUM | | ALLOWABLE LENGTHS | GTHS BETWEEN | EEN SUPPORTS | (Clear | Span) | | |
|---|--|--|---|--|--|--|--|--|---|---|---|--|
| Size of Joists (Nominal) in Inches | Spacing of Joists Center to Center in Inches | Having dete species of stress. T and use th | Spanspacing determined by reference to the building species of timber used, refer to the column bacters. THEN refer to the tables on page 8 and use the shorter of the two spans. | Spa rmined by reference to the buildin timber used, refer to the column HEN refer to the tables on page he shorter of the two spans. | Spans Lim he building code column below on page 8 and | s Limited by He code or the tab elow with the can and in the san | Spans Limited by Horizontal Shear ding code or the table on page 1 thm below with the corresponding vige 8 and in the same manner deta | ited by Horizontal Shear (Read Carefully) or the table on page 1 the horizontal shear stress in pounds with the corresponding value to determine the span limited in the same manner determine the span of the joist limited | efully) al shear stres ermine the s span of the | s in pounds pan limited l joist limited | per square inch for the by the horizontal shear by its bending strength | ch for the ntal shear g strength |
| | | S=70 | S=75 | S=80 | S == 85 | 06=S | S=95 | S=100 | S=105 | S=110 | S=120 | S=125 |
| 2 x 6 | 12 | Ft. Ins. 8—10 6—7 | Ft. Ins. 9— 5 | Ft. Ins. 10— 0 7— 6 | Ft. Ins. 10— 7 8— 0 | Ft. Ins. 11— 2 8— 6 | Ft. Ins. 11—10 9—0 | Ft. Ins. 12— 6 9— 5 | Ft. Ins. 13—1 9—10 | Ft. Ins. 13—8 10—5 | Ft. Ins. 15— 0 11— 4 | Ft. Ins. 15— 7 11— 9 |
| 2 x 8 | 12 16 24 | | 12— 5 9— 5 6— 4 | 13— 2 10— 0 6— 8 | 14 - 0 $10 - 7$ $7 - 1$ | $\frac{14-10}{11-2}$ | 15— 8 11—10 8— 0 | 16— 6 12— 6 8— 5 | 17— 5 13— 1 8— 9 | 18— 2 13— 9 9— 2 | | 20— 7 15— 7 10— 6 |
| 2 x 10 | 12 16 24 | 14— 6 11— 0 7— 5 | 15— 6 11— 9 7—10 | 16— 7 12— 7 8— 6 | 17— 7 13— 5 9— 0 | 18— 8 14— 2 9— 6 | 171 | 20— 8 15— 8 10— 7 | 111 | 111 | 177 | 711 |
| 2 x 12 | 12 16 24 | 17— 5 13— 2 8—10 | 18— 8 14— 2 9— 7 | 19-10 $15-1$ $10-2$ | $ \begin{array}{c} 21 - 1 \\ 16 - 1 \\ 10 - 10 \end{array} $ | 22— 5 17— 0 11— 6 | 23— 7 18— 0 12— 1 | 24-10 $18-10$ $12-9$ | 26—1 19—10 13—5 | 27— 5 20— 9 14— 0 | 29— 9 22— 8 15— 4 | 30— 0 23— 7 16— 0 |
| 2 x 14 | 12 16 24 | | 111 | $\begin{array}{c} 23 - 0 \\ 17 - 7 \\ 11 - 10 \end{array}$ | 24— 6 18— 8 12— 8 | 25—10 19— 9 13— 5 | 27— 5 20—10 14— 1 | 28— 9 22— 0 14—10 | $\begin{array}{c} 30 - 0 \\ 23 - 1 \\ 15 - 7 \end{array}$ | 24— 2 16— 5 | 26— 5 17—10 | 27— 6 18— 7 |
| 3 x 6 | 12 16 24 | 13—10 10— 6 7— 1 | 111 | 15-10 $12-0$ $8-1$ | 16—10 12— 9 8— 7 | 17—10 13— 6 9— 1 | 18—10 14— 4 9— 7 | 19— 9 15— 1 10— 1 | 20 - 9 $15 - 9$ $10 - 7$ | 21 - 9 $16 - 7$ $11 - 2$ | 23— 9 18— 1 12— 2 | 24— 9 18— 9 12— 8 |
| × × | 12 16 24 | 18—2 13—10 9—5 | 19— 7 14—10 10— 1 | 20—10 15—10 10—8 | 22— 2 16—10 11— 5 | 23— 6 17—10 12— 1 | 24— 9 18— 9 12— 8 | 26— 1 19— 9 13— 5 | 27— 5 20— 9 14— 1 | 28— 8 21— 9 14— 9 | 30— 0 23— 9 16— 1 | 24— 9 16— 9 |
| 3 x 10 | 12 16 24 | 22— 9 17— 5 11— 9 | 111 | 26— 0 19—10 13— 6 | 27— 8 21— 1 14— 4 | 29— 4 22— 5 15— 2 | 30— 0 23— 7 16— 0 | 24— 9 16—10 | 26— 1 17— 8 | 27— 4 18— 6 | 29— 9 20— 2 | 30— 0 21— 1 |
| 3 x 12 | 12 16 24 | 27— 2 20— 9 14— 2 | 29— 1 22— 4 15— 2 | 30— 0 23— 9 16— 2 | 25— 4 · 17— 2 | 26— 9 18— 2 | 28— 4 19— 2 | 29— 8 20— 2 | 30— 0 21— 4 | 22— 4 | 24— 4 | 25— 4 |
| 3 x 14 | 12 16 24 | 30— 0 24— 2 16— 6 | 25—10 17—8 | 27—7 | 29— 4 20— 1 | 30— 0 21— 2 | 22— 5 | 23— 7 | 24— 9 | 26—0 | 28— 4 | 29— 6 |
| 4 x 6 | 12 16 24 | 18—10 14— 5 9— 8 | 111 | 111 | 23— 0 17— 6 11— 9 | 24— 4 18— 6 12— 6 | 25— 8 19— 6 13— 2 | 27— 0 20— 7 13—10 | 28— 5 21— 7 14— 7 | 29— 8 22— 7 15— 4 | 30— 0 24— 8 16— 8 | 25— 8 17— 5 |
| 4 x 8 | 12 16 24 | 24— 8 18—10 12— 9 | 26— 6 20— 2 13— 8 | 28— 2 21— 7 14— 8 | 30— 0 22—10 15— 7 | 24— 4 | 25— 7 17— 5 | 27— 0 18— 4 | 28— 4 | 29—8 | 30— 0 | 22—10 |
| 4 x 10 | 12 16 24 | 30— 0 23— 7 16— 1 | 25— 2 17— 2 | 26—10 18— 5 | 28— 7 19— 6 | 30— 0 | 21— 9 | 23— 0 | 24-1 | 25- 4 | 27—7 | 28— 8 |

NATIONAL LUMBER MANUFACTURERS ASSOCIATION

Page Ten

FLOOR JOIST SPANS (90 Pound Load)

| | | 95.15 | 000 | Ins. | 61 | 00 | 21 4 01 | ∞ ∞ 61 | 101 | F 4 | 0 40 | 6 9- | 0 65 | 1 | 0000 | 400 | -0 | 4 |
|---|--------------|--|---|----------|----------|--------------|-------------------------|-------------------------|-------------------------|---------------------|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|--|
| - | | extreme fibre to the column of the joist. | 6-1 000 | Ft. | | 13- | 16- | 11— 19— 17— | 23— 20— | 16— | 16— 14— | 200— | | 28—10 25—3 | | 111 | 23—11 20—11 | 177 |
| Ceiling. | | wable extreme fibre refer to the column rength of the joist. the joist limited by | 6-1700 | Ft. Ins. | 9-5 | | 15—10 13—9 | 11— 4 19— 1 16— 8 | 111 | $\frac{16-1}{12-0}$ | $\frac{10-5}{15-11}$ | 1111 | 111 | 1111 | 1111 | 10-0 18-6 16-3 | 111 | quare foot) oct). d ceiling, or |
| Unplastered | | y) i. I the allowable imber used, refer bending strength. the span of the ji | f-1.600 | Ft. Ins. | 9 - 2 | 11 | 111 | 1111 | 21— 9 18—11 | 111 | 15 - 5 13 - 5 | 1117 | | 717 | 19— 7 13— 7 11—10 | 9— 9 17—11 15— 9 | | ounds per ser square for ith plastered. |
| with Unp | | Spans Determined by Bending (Read Carefully) determined by reference to the building code or the table on page 1 the allowable extreme in bending in pounds per square inch for the species and grade of timber used, refer to the corresponding value to determine the span limited by the bending strength of the refer to the table on page 11 and in the same manner determine the span of the joist limit ntal shear and use the shorter of the two spans. | f=1.500 | Ft. Ins. | 8—10 | | 171 | 18— 0 15— 8 | 1111 | 11 | | 10— 9 18—10 16— 5 | 22— 6 19— 9 | 111 | 13 - 3 | 9-5 17-5 15-3 | 1171 | oun (oun ar ar ar seili) |
| Foot | (Clear Span) | y Bending (Read code or the table the species and g the span limit same manner de spans. | f=1.400 | Ft. Ins. | 7 -8 | | | | 111 | 117 | 14— 5 12— 7 | 1117 | $\frac{13-0}{21-10}$ | 1111 | 1111 | 16—10 14— 9 | 21-1 18-5 15-9 | nd plaster cof flooring (are foot of |
| LY LOADED | SUPPORTS (| Determined by I the building cod uare inch for the ine to determine II and in the spec of the two sp | f=1,300 | Ft. Ins. | 8 - 4 | 111- | 171 | | | 11 | 14-0 | | 111 | | 111 | | 1111 | t of joist. It of lath as e thickness ands per squands |
| UNIFORMLY 1 | BETWEEN SI | Spans Determined by rence to the building codes per square inch for thing yalue to determine on page 11 and in the sthe shorter of the two s | f=1,200 | Ft. Ins. | 8 0 | | 111 | | | | | 171 | | | | | | |
| JOISTS-U | LENGTHS BE | Spans d by reference to g in pounds per sc corresponding val- the table on page r and use the shor | f=1,100 | Ft. Ins. | 7 - 7 | 111 | 111 | | 111 | 111 | 1711 | 111 | 177 | 22— 6 19— 9 16— 4 | 1171 | 11 | 1111 | Dead load |
|)R | ALLOWABLE LE | | f=1,000 | Ft. Ins. | 7-2 | 111 | 111 | | | | 1111 | 1111 | 1111 | 171 | 1111 | 12 - 5 | 717 | |
| S FOR F | MUM ALLO | H | f=900 | Ft. Ins. | 6-10 | 8 0 8 | 11 6 | 111 | 1111 | 111 | 1111 | 1111 | 1111 | 171 | 171 | 13— 6 11— 9 9— 9 | 771 | igth. |
| M SPANS with Plaste | MAXIM | of the Span to the build- the allowable lis per square used, refer to corresponding | E=1,600,000 | Ft. Ins. | 8-17-4 | 10-8 | 13— 7 12— 5 10— 9 | 171 | 19— 3 17— 6 15— 5 | 111 | 111 | 111 | 1111 | 1117 | 10— 6 9— 7 8— 5 | $\frac{13-11}{12-9}$ | 17 - 6 $16 - 1$ $14 - 0$ | of span len |
| MAXIMUM SPANS FOR FLOC Square Foot with Plastered Ceiling. | | Limited by Deflection of 1/360 of the Span aving determined by reference to the building code or the table on page 1 the allowable modulus of elasticity in pounds per square inch for the species of timber used, refer to the column below with the corresponding value to determine span. | E=1,200,000 $E=1,400,000$ $E=1,600,000$ | Ft. Ins. | 7-8 | 10— 4 | 13— 0 11— 9 10— 5 | 1111 | 171 | 111 | 111 | 15-1 13-10 12-1 | 18-3 16-9 14-7 | 21— 4 19— 6 17— 3 | 10-0 9-1 8-0 | 13— 4 12— 1 10— 9 | 16— 9 15— 4 13— 6 | —The lengths are based on: When limited by deflection— Maximum allowable deflection of 1/360 of span length. Modulus of elasticity as noted for "E." When determined by bending strength of the piece— Allowable stress in extreme fibre in bending as noted it |
| per | | Limited by Deflection of Having determined by referring code or the table on I modulus of elasticity in inch for the species of the column below with value to determine span. | E=1,200,000 | Ft. Ins. | 7-4 6-8 | 9— 8 8—10 | 12— 4 11— 2 9— 9 | 14—10 13— 7 11—10 | 17— 6 15—11 14— 0 | 8-7 | 11— 5 10— 5 9— 1 | 14— 5 13— 3 11— 6 | 17— 4 15—10 13—11 | 20— 3 18— 6 16— 4 | 9-6 | 12-7 11-6 10-1 | 15—11 14— 6 12—10 | d on: owable deflection— lasticity as n by bending ess in extren |
| d 90 Pounds | | H | E=1,000,000 | Ft. Ins. | 71 | 9-2 8-4 | 111—7 10—7 9—2 | 14— 0 12— 9 11— 2 | 16— 5 15— 0 13— 3 | 8-17-5 | 10— 9 9—10 8— 7 | 13— 6 12— 5 10—11 | 16— 4 14—11 13— 1 | 19— 1 17— 6 15— 5 | 0 - 8 - 2 - 3 - 3 - 3 | 11—11 10—10 9—6 | 15— 0 13— 9 12— 0 | gths are base maximited by Maximum all Modulus of e n determined Allowable str |
| Live Load 90 | | Spacing of Joists Center to Center in Inches | | | 12 16 | 12 16 | 12 24 24 | 12 16 24 | 12 16 24 | 12 16 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | rE.—The len |
| | | Size of Joists (Nominal) in Inches | | | 2 x 6 | 2 x 8 | 2 x 10 | 2 x 12 | 2 x 14 | 3 x 6 | 3 x 8 | 3 x 10 | 3 x 12 | 3 x 14 | 4 x 6 | 4 x 8 | 4 x 10 | NOTE. |

FLOOR JOIST SPANS (90 Pound Load)

| No. of the control | | | | | MAX | MAXIMUM ALLO | ALLOWABLE LED | LENGTHS BETV | BETWEEN SUPPORTS | ORTS (Clear | Span) | | |
|---|---|----------------|---------------------------|-----------------------------|---|--------------------------------------|--|----------------|--|-------------|------------------------------|-----------------------------|--|
| 6 12 Ft. Ins. | Size of Joists (Nominal) in Inches | | Having de species stress. | of timber use THEN refer | reference to divergence to the test of the tables of the two sp | Spans he building con page 10 a ans. | Limited by B ode or the ta ow with the nd in the san | lorizontal She | ar (Read Can the horizont value to de termine the | 204 | pounds limited limited | per square in by the horizo | ch for the ntal shear g strength |
| 6 16 17 18 Pt. Ins. | | | S=70 | 111 | S=80 | 111 | 111 | | S=100 | S=105 | S=110 | S=120 | S=125 |
| 8 116 10-6 11-2 12-0 11- | 9 x | 12 | | | | | | | | | | | Ft. Ins. 14— 2 10— 8 |
| 10 | 1914 | 12 | 17 | 11 | 25 | 111 | II | 111 | 11 | 17 | 111 | 111 | 18— 8 14— 2 |
| 12 16 16 16 17 18 19 19 19 10 18 19 19 10 10 11 18 19 18 19 18 19 18 19 18 18 | | 12 16 24 | 111 | 111 | 11- | 1111 | 111 | 111 | 1111 | 111 | 1111 | 111 | 111 |
| 14 12 18-6 19-8 21-0 22-4 23-7 24-10 26-2 27-6 28-9 30-0 25-0 24-0 26-0 27-0 26-0 27-0 26-0 27-0 26-0 27-0 26-0 27-0 26-0 27-0 26-0 27-0 26-0 27-0 26-0 26-0 26-0 27-0 26-0 27-0 26-0 27-0 26-0 27-0 26-0 27-0 26-0 27 | - | 12 16 24 | 111 | 171 | 888 | 111 | 111 | 111 | 111 | 111 | | 117 | 28— 4 21— 6 14— 6 |
| 6 12 12 13 6 14 6 15 17 1 18 0 18 10 19 21 7 13 6 14 6 15 4 15 9 17 21 2 2 1 1 18 0 18 10 16 2 17 17 18 0 18 10 11 7 18 0 18 10 16 2 17 18 0 18 10 18 0 18 10 16 2 17 18 0 18 10 18 19 18 19 18 18 19 18 | - | 12 16 24 | 111 | 111 | 11000 | 111 | 1111 | 111 | 1111 | 1111 | | 111 | 25— 0 16—10 |
| 8 12 16 7 17 9 19 20 2 21 4 22 6 23 8 24 16 20 20 2 21 4 16 2 17 1 18 0 18 10 18 1 26 11 1 18 0 18 1 16 2 2 2 1 18 1 18 1 18 1 18 1 18 0 18 1 18 1 18 1 18 1 18 1 19 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 4 4 16 1 4 16 1 4 16 1 4 16 1 4 16 1 4 16 1 4 | CP PO | 12 | 11 | 11 | 17 | 111 | 111 | 11 | 111 | 8-1 | 111 | 11 | 22— 6 17— 1 |
| 10 12 20—8 22—2 2 26—8 28—1 29—7 30—0 24—9 27—1 28—1 16 16 16 16 16 16 27—7 23—8 24—9 27—1 28—1 12 24 10—8 11—6 18—1 13—0 24—5 25—8 27—1 23—8 24—9 18—5 19—2 14 16 18—10 20—4 21—7 21—6 22—7 23—8 24—9 18—5 19—7 14 16 18—10 13—9 14—8 15—7 16—7 17—6 18—5 29—9 30—0 24—9 27—1 23—8 29—1 29—1 23—9 24—9 27—1 23—9 24—9 27—1 23—9 24—9 27—1 23—9 24—9 27—1 23—9 24—9 27—1 23—9 24—9 27—1 23—9 24—9 27—1 23—9 24—9 27—1 23—9 24—1 23—1 | OF TO M | 12 16 24 | 111 | 1111 | 9-4-6 | 1111 | 111 | 111 | 1111 | | 1111 | 111 | 29— 7 22— 6 15— 2 |
| 12 24 9 26 6 28 4 30 0 24 5 25 8 27 1 28 5 29 9 30 0 14 16 18 10 20 4 21 5 25 8 20 1 1 1 20 2 2 25 8 30 0 24 5 1 1 1 2 3 3 0 3 3 0 3 0 3 3 0 3 3 3 0 3 3 3 0 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 <td></td> <td>12 16 24</td> <td>111</td> <td>171</td> <td>2000</td> <td>111</td> <td>111</td> <td>111</td> <td>111</td> <td></td> <td>111</td> <td>11</td> <td>28— 2 19— 1</td> | | 12 16 24 | 111 | 171 | 2000 | 111 | 111 | 111 | 111 | | 111 | 11 | 28— 2 19— 1 |
| 14 12 28—8 30—0 26—8 28—4 29—10 30—0 30—0 22—6 23—7 25—8 26—8 24 15—0 16—1 17—2 18—2 19—4 20—10 22—6 23—7 25—8 26—8 12 15—0 16—1 17—2 18—2 19—4 20—16 21—6 22—6 23—7 25—8 26—8 24 18—1 14—10 15—10 16—9 17—8 18—8 19—7 20—6 22—6 23—6 23—7 25—8 23—6 23—7 25—8 23—6 23—6 23—7 25—8 23—6 23—6 23—7 25—8 23—8 23—1 23—6 23—7 25—8 23—8 23—6 23—7 | - | 12 16 24 | 177 | 111 | 8114 | 111 | 111 | 111 | 11 | 86 | 11 | 111 | 23— 0 |
| 6 12 17-2 18-5 19-8 20-10 22-1 23-4 24-7 25-9 27-0 29-6 30-8 24 18-16 13-1 14-10 15-10 16-9 17-8 18-8 19-7 20-6 22-5 23-5 8 12 22-6 24-1 25-8 27-4 28-10 30-0 12-7 13-2 13-10 15-1 15-1 8 16 17-2 18-5 19-7 20-10 22-1 23-4 24-6 25-9 27-0 29-5 30- 24 11-8 12-6 13-4 14-1 15-0 15-9 16-7 17-6 18-4 20-0 20-0 10 22-0 30-0 24-6 26-0 16-7 17-6 18-4 20-0 20-0 20-0 10 21-5 23-0 24-6 26-0 27-7 20-1 20-1 21-0 23-0 25-1 26-1 | - | 12 16 24 | 111 | 111 | 12 | | 11 | 1 | 11 | | | 1 | |
| 8 12 22-6 24-1 25-8 27-4 28-10 30-0 30-0 24-6 25-9 27-0 29-5 30-2 10 12 28-0 30-0 24-6 26-0 27-0 29-5 30-0 10 16 21-5 23-0 24-6 26-0 27-7 20-1 27-7 20-0 20-0 20-0 10 21-5 23-0 24-6 26-0 27-7 29-1 30-0 21-10 23-0 25-1 26-1 | and la | 12 16 24 | 111 | 111 | 9-1 | 771 | 111 | 1111 | 111 | 1111 | 1117 | 111 | 1111 |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | | 12 16 24 | 111 | 111 | 302 | 171 | | 1111 | 11 | 12 | 111 | 11 | 111 |
| | | 12 16 24 | 111 | 1111 | 1-9 | | | | 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | T | | 1 | 1331 |

NATIONAL LUMBER MANUFACTURERS ASSOCIATION

FLOOR JOIST SPANS (100 Pound Load

Live Load 110 Pounds per Square Foot with Unplastered Ceiling. MAXIMUM ALLOWABLE LENGTHS BETWEEN SUPPORTS (Clear Span) MAXIMUM SPANS FOR FLOOR JOISTS-UNIFORMLY LOADED Square Foot with Plastered Ceiling. Live Load 100 Pounds per

| | | | | | | 1 | FL | 00 | R | JO | IST | SP | ANS | (| 100 | Po | un | d L | oad) | | | | | | | |
|--|---|---|----------|-------|-------|----------------|-------|--------|------|-------|--------|----------------------|-------|-------|--------|------|--------|---------------------|----------------|--------|-------------------|-------|---------------------|--------|--|--|
| | extreme fibre to the column n of the joist. | f=1,800 | In | 1 | 10- 9 | 13-7 | 1 | 18-10 | 1 | 1 | 19—4 | $\frac{11-10}{10-3}$ | 15-9 | 1 | 19— 9 | | 1 | 20 - 9 $17 - 1$ | 111 | 13—11 | | 18-3 | 15—11 13— 1 | 22—11 | $\begin{vmatrix} 20 - 0 \\ 16 - 6 \end{vmatrix}$ | |
| | | f=1,700 | In | 12-0 | 1 | 13 - 2 | 1 | 18— 4 | 1 | 1 | 18-9 | 11-6 | 15-3 | T | 19-1 | 11 | 23-0 | 20 - 1 $16 - 7$ | 71 | 13 - 5 | 11 | 17- 9 | 15— 6 12— 9 | 1 | 19— 6 16— 1 | |
| 1 | the allowable ober used, refer bending strengt | f=1,600 | Ft. Ins. | 11-8 | 10-1 | 11 | 10- 6 | 17 9 | 11 | 20-10 | 18-1 | 11-1 | 14-9 | 1 | 18-7 | 11 | 1 | 19— 6 16— 1 | | 13 0 | 11-4 | 1 | 15— 0 12— 5 | 1 | 18—11 | |
| (Read Carefully) | table on page 1 and grade of timl limited by the b er determine the | f=1,500 | Ft. Ins. | 1 | 6 — 6 | 14— 4 12— 5 | 10-1 | 17 2 | | 20-1 | 17—7 | 171 | 14-4 | 1 | 18-0 | T | 21 - 7 | 18-11 | 11 | 18-3 | 11 | 1 | 14 - 6 $12 - 0$ | T | 18— 4 15— 1 | |
| | or the table species and se span limite manner de | f=1,400 | Ft. Ins. | T | 9 —6 | 11 | 6 — 6 | 16-7 | IT | 1 | 17-0 | 111 | 13—10 | 7 | 17 - 5 | 11 | 1 | 18-3 | 11 | 12-3 | 11 | 1 | 14-0 | 1 | 17—9 | |
| Determined by Bending | determined by reference to the building code or the table on page 1 the allowable extreme fibre in bending in pounds per square inch for the species and grade of timber used, refer to the column with the corresponding value to determine the span limited by the bending strength of the joist, refer to the table on page 13 and in the same manner determine the span of the joist limited by natal shear and use the shorter of the two spans. | f=1,300 | Ft. Ins. | Ī | 9-1 | 11 | 9- 5 | 16-0 | 11-5 | T | 16 5 | 111 | 13— 5 | 1 | 16-9 | 11 | 1 | $\frac{17-7}{13-6}$ | 23— 6 | 11-9 | 11 | 1 | 13—6 | -6 | $\frac{17-0}{14-0}$ | |
| Spans Determ | rence to the bui ds per square in ding value to de on page 13 and the shorter of th | f=1,200 | Ft. Ins. | 10-1 | 6 -8 | 12— 9 11— 1 | 9-1 | 15 - 5 | 11 | 1 | 15-9 | 111 | 12—10 | 9-3 | 16-1 | 11 | | 16—11 | 11 | 11-4 | 71 | T | 13-0 | 1 | 16-5 | |
| Sp | aving determined by reference to the stress in bending in pounds per squanelow with the corresponding value. THEN refer to the table on page 13 horizontal shear and use the shorter | f=1,100 | Ft. Ins. | 1 | 8 - 5 | 12— 2 10— 7 | 8 - 8 | 14-8 | 11 | 17-4 | 15-1 | 111 | 12-3 | 7 | 15 5 | 11 | 1 | 16-3 | 17 | 10-10 | 11 | 1 | 12—5 | 1 | 15— 9 12—11 | |
| | aving determined by references in bending in pounbelow with the corresponTHEN refer to the horizontal shear and use | f=1,000 | Ft. Ins. | 1 | 8-0 | 11-8 | 8- 4 | 14-1 | 11 | 1 | 14- 5 | | 11 9 | 8 - 2 | 14-9 | Ī | 1 | 15-5 | 20- 7 | 10-4 | 8-11 | 13-7 | $\frac{11-11}{9-9}$ | 17 - 1 | 14—11 12— 4 | |
| | Having stress below THEN horizor | f=900 | Ft. Ins. | 8 -8 | 7-7 | 11 | 7—10 | 13-4 | 11 | 15-7 | 13-7 | 111 | 11-0 | 1 | 13—11 | | 16- 9 | $\frac{14-7}{12-0}$ | 11 | 9-9 | 11 | 12-11 | 11-4 | 1 | 14— 3 11— 9 | |
| e Span | to the build- if the allowable ds per square dsed, refer to corresponding | 1,600,000 | Ft. Ins. | 10- 5 | 9 -6 | 11 | 10- 6 | 15—10 | 11 | 18-9 | 11 | | 12-3 | 1 | 15- 5 | 11 | | 16—11 14—11 | 21— 9 19—10 | 10-3 | 11 | 1 | 12 - 4 $10 - 10$ | 17 - 0 | 15-7 | |
| f 1/360 of th | y reference to the state of the state of timber used, with the correspond | =1,400,000 F | Ft. Ins. | 1 | 9-1 | 11 | 10-0 | 15-2 | | 1 | 16-4 | TI | 10- 9 | 1 | 14- 9 | | 1 | 16— 3 14— 3 | 20-9 | 11 | 8—11 7—10 | 1 1 | 10-10 | 16-4 | 13—11 | |
| Limited by Deflection of 1/360 of the Span | Having determined by reference to the build- ing code or the table on page 1 the allowable modulus of elasticity in pounds per square inch for the species of timber used, refer to the column below with the corresponding value to determine span. | =1,000,000 $ $ E $=$ 1,200,000 $ $ E $=$ 1,400,000 $ $ E $=$ 1,600,00 | Ft. Ins. | 9-6 | 8 - 7 | 17 | 9 —6 | 14-5 | 11 | T | 15 6 | 111 | 11-1 | T | 14-0 | 11-3 | 7 | 15- 5 | 19 9 | 11 | 8-2-2-2-2 | 1 | 9—10 | 1 | 14— 1 12— 5 | |
| Limited by | Having dete ing code o modulus c inch for t the colum | E=1,000,000 E | Ft. Ins. | 1 | 8— 1 | 11-2 | 0 —6 | 13-7 | T | 1 | 14— 6 | | 10—6 | 1 | 13-3 | | 1 | 14— 6 12— 9 | 18— 6 16—11 | | 8-0 2-0 1-2 | 1 | 9-4 | 14-6 | 13-4 | |
| Spacing of | Joists Center to Center in Inches | 1 | | 12 | 16 | 12 | 24 | 12 | 24 | 12 | 16 | 12 16 | 12 | 24 | 12 | 24 | 12 | 24 | 12 16 | 12 | 16 24 | 12 | 16 | 12 | 24 | |
| 200 | Joists O. Joists (Nominal) in Inches | | | 8 46 | 4 | 2 x 10 | | 0 4 10 | 4 | | 2 x 14 | 3 x 6 | × 60 | | 3 v 10 | 0140 | | 3 x 12 | 3 x 14 | | 4 x 6 | | 4 x 8 | | 4 x 10 | |

Dead load—Weight of joist.

Weight of lath and plaster ceiling (10 pounds per square foot).
Double thickness of flooring (5 pounds per square foot).

Live load—100 pounds per square foot of floor area with plastered ceiling, or 110 pounds per square foot with ceiling unplastered. "f." NOTE.—The lengths are based on:

When limited by deflection—
Maximum allowable deflection of 1/360 of span length.

Modulus of elasticity as noted for "E."

When determined by bending strength of the piece—
Allowable stress in extreme fibre in bending as noted for

FLOOR JOIST SPANS (100 Pound Load)

| Spann Limited by Horizontal Shear (Raad Cartelly) Spann Limited by Horizontal Shear (Raad Cartelly) Spann Limited by Horizontal shear stress in paniety and care and by reference to the building goods or the table on superior of the pulling goods or the table on superior of the pulling goods or the table on superior of the pulling goods or the table on superior of the pulling goods or the table on superior of the pulling goods or the table on superior of the pulling goods or the table on superior of the pulling goods or the table on superior of the pulling goods or the table of the superior of the pulling goods or the table or the superior of the pulling goods or the table of the superior of the pulling goods or the superior of the | 100 | | | | MAXIMUM | | ALLOWABLE LEN | LENGTHS BETWEEN | EEN SUPPORTS | (Clear | Span) | | |
|--|---|----------------|-----------------------------|---|---|--|--|-----------------|---|--|-----------------|-------|---------------------------|
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$ | Size of Joists (Nominal) in Inches | | Having de species c stress. | termined by roof timber used THEN refer the shorter o | eference to the refer to the tables of the tables of the two spirit | Spans he building con column below on page 12 ans. | Limited by H ode or the tab ow with the c ind in the sar | orizontal She | ar (Read Car the horizonta value to det | efully) I shear stress ermine the signan of the j | | | tal shear strength |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$ | | | S=70 | S=75 | S=80 | S=85 | 06≃S | S=95 | S=100 | S=105 | S=110 | S=120 | S=125 |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$ | | | | | | | | 1500 | | | | In | I |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | × | 12 | 11 | 11 | 11 | 11 | 11 | 800 | 11 | 17 | 11 | 11 | 11 |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | | 12 | 11 | | 3 | 111 | 11 | 11 | 111 | 11 | 11 | 11 | 21—7 |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | × | 24 | | 11 | 1 | 1 | T | 1 | 1 | 1 | 1 | | |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | x 1 | 12 | 11 | 11 | 6-10 | 11 | 11 | | 111 | 111 | 111 | | 25—10 19—8 13—2 |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | × | 12 16 | | 1 11 | 6.4 | 111 | 111 | | 111 | 111 | 111 | | 117 |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$ | | 24 | 111 | 11 | īli | 11 | 117 | 111 | 111 | 111 | 111 | 11 | 11 |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$ | × | 16 | | | 1 | 1 | 1 | TI | 1 | 1 | 1 | | 1 |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | × | 12 16 24 | 111 | 111 | 117 | 111 | 171 | 111 | 111 | 111 | 111 | 111 | 27 - 2 $20 - 7$ $13 - 10$ |
| x 12 12 22-9 24-5 26-0 27-7 29-4 30-0 17-8 18-7 19-10 21-7 22-5 23-7 24-9 26-1 17-8 18-6 21-7 22-5 23-7 24-9 26-1 17-8 18-6 20-2 21-7 22-5 23-7 24-9 26-1 17-8 18-6 20-2 21-8 23-1 24-7 26-0 27-5 28-10 30-0 27-7 26-0 27-5 28-10 30-0 27-2 28-10 30-0 | × | 12 16 24 | 111 | 111 | | 1117 | 111 | 111 | 111 | 111 | 711 | 171 | $\frac{25-10}{17-6}$ |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | x 1 | 12 16 24 | 111 | 111 | | 111 | 111 | 111 | 17 | 11 | 11 | 11 | 31— 1 21— 1 |
| x 6 16 19 16 19 2 20 4 21 5 22 6 23 8 24 9 27 0 x 6 16 12 9 13 8 14 6 15 5 17 1 18 9 20 6 x 8 12 8 9 2 9 10 5 11 6 12 1 18 9 20 6 30 0 18 9 20 6 30 0 18 9 20 6 30 0 18 9 20 6 20 6 23 7 24 9 27 0 18 9 18 9 18 9 18 9 18 9 18 9 18 9 18 9 18 9 18 9 18 9 18 < | X 1 | 12 16 24 | 111 | 111 | 111 | 11 | 11 | 11 | 71 | 11 | 1 | | |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | × | 12 16 24 | 8 2 2 2 | 711 | 111 | 111 | 111 | 111 | 111 | 111 | 111 | 111 | 28— 2 21— 5 14— 5 |
| x 10 16 19—8 21—1 22—6 23—10 25—4 26—8 28—1 29—7 30—0 | × | 12 16 24 | 111 | 171 | 111 | 111 | 111 | 111 | 111 | 111 | 11 | 11 | 28— 1 19— 1 |
| 4 15-0 14-0 10-4 10-4 11-2 10-2 15-1 20-1 21-1 25-0 | × | | 25 8 19 8 13 5 | 27— 7 21— 1 14— 5 | 111 | 171 | 25— 4 17— 2 | 26— 8 18— 2 | 28— 1 19— 1 | 29— 7 | 30 - 0 $21 - 1$ | 23-0 | 23—10 |

Page Fourteen

Live Load 125 Pounds per Square Foot with Plastered Ceiling. Live Load 135 Pounds per Square Foot with Unplastered Ceiling.

MAXIMUM SPANS FOR FLOOR JOISTS-UNIFORMLY LOADED

FLOOR JOIST SPANS (125 Pound Load)

| | | | | | FLO | OR JOI | ST S | PANS (| 125 Pou | nd Load | 1) | | | | |
|--------------|--|--|--------------------|-------------------------------|----------------------|--------------------------|--------------------|-------------------------|-------------------------|---|-------------------------|--|----------------------------|---------------------------|--|
| | ne fibre column e joist. lited by | f=1,800 | Ft. Ins. 11—2 9—9 | 14— 2 12— 5 | $\frac{17-2}{14-10}$ | 20— 1 17— 6 14— 5 | 10— 9 | 14— 3 12— 5 10— 1 | $\frac{17-11}{15-7}$ | 21— 7 18—10 15— 6 | 25— 3 22— 0 18— 3 | 12— 6 10—11 8—11 | 16— 7 14— 6 11—11 | 20—11 18— 3 15— 0 | t). |
| | allowable extreme fibre used, refer to the columning strength of the joist. | f=1,700 | Ft. Ins. 10—10 9—6 | $\frac{13}{12}$ $\frac{9}{0}$ | 16— 8 14— 6 | 19— 6 17— 0 14— 0 | 10— 5 | $\frac{13-10}{12-0}$ | 17— 5 15— 3 12— 6 | 21— 0 18— 4 15— 1 | 24— 6 21— 5 17— 7 | 12— 3 10— 7 8— 9 | 16— 3 14— 1 11— 7 | 20— 4 17— 9 14— 7 | square foot). red ceiling, or |
| | the the | f=1,600 | Ft. Ins. 10—7 9—2 | 13— 5 | 16— 2 14— 1 | 18—11 16— 6 13— 7 | $10 - 1 \\ 8 - 10$ | 13— 5 11— 9 9— 7 | 16-11 $14-9$ $12-1$ | 20— 5 17—10 14— 7 | 23—10 20—10 17—1 | 11—10 10— 4 8— 5 | 15-9 13-9 11-3 | 19— 9 17— 3 14— 1 | pounds per square foo per square foot), with plastered ceiling, |
| (1 | Carcfu on par rade of ed by t | f=1,500 | Ft. Ins. 10—2 8—10 | 13-0 | 15— 8 13— 7 | 18-5 16-0 13-1 | 9—10 8—6 | 13— 0 11— 4 9— 4 | 16— 5 14— 4 11— 9 | 19— 9 17— 3 14— 1 | 23— 0 20— 1 16— 7 | 11—5 9—11 8—3 | 15— 3 13— 3 10—11 | 19— 1 16— 9 13— 9 | eiling (10 (5 pounds floor area th ceiling |
| (Clear Span) | ts tan | f=1,400 | Ft. Ins. 9—10 8—7 | $\frac{12-7}{10-10}$ | 15— 2 13— 2 | 17— 9 15— 6 12— 9 | 9 - 6 | 12—7 10—11 9—0 | 15-10 $13-10$ $11-4$ | 19— 1 16— 7 13— 9 | 22— 3 19— 5 16— 0 | $\begin{array}{c} 11 - 0 \\ 9 - 7 \\ 7 - 11 \end{array}$ | 14— 9 12—10 10— 6 | 18— 5 16— 1 13— 4 | and plaster of flooring luare foot o |
| SUPPORTS | ined by ilding concept for the etermine in the sin the | f=1,300 | Ft. Ins. 9—6 | $\frac{12}{10}$ | 14— 7 12— 8 | 17—1 14—11 12—3 | 9-17-11 | 12— 2 10— 7 8— 9 | 15— 3 13— 4 10—11 | 18— 5 16— 0 13— 3 | 21— 5 18— 9 15— 5 | 10— 9 9— 4 7— 7 | 14— 1 12— 4 10— 1 | 17—10 15—6 12—10 | Weight of joist. Weight of lath and plaster c Double thickness of flooring 125 pounds per square foot of 135 pounds per square foot with |
| BETWEEN S | Spans Determace to the but per square ir ng value to du page 15 and e shorter of t | f=1,200 | Ft. Ins. 9—288—0 | $\frac{11-7}{10-1}$ | $\frac{14-0}{12-2}$ | 16— 5 14— 4 11— 9 | 8—10 7—7 | 11—7 10—1 8—4 | 14— 9 12—10 10— 6 | 17— 7 15— 5 12— 7 | 20— 7 18— 0 14—10 | 10— 3 8—11 7— 4 | $\frac{13-7}{11-10}$ $9-9$ | 17 - 1 $14 - 11$ $12 - 4$ | load- |
| LENGTHS B | Spa d by reference g in pounds per corresponding the table on pa and use the sk | f=1,100 | Ft. Ins. 8— 9 7— 7 | 11—11 | 13— 5 11— 8 | 15— 9 13— 9 11— 3 | 8-5 | 11— 1 9— 9 7— 6 | 14— 0 12— 3 10— 0 | 16—11 14— 9 12— 1 | 19— 9 17— 3 14— 3 | 9—10 8—6 7—0 | 13— 0 11— 4 9— 4 | 16— 4 14— 4 11— 9 | Dead load |
| ALLOWABLE L | - 7 0 | f=1,000 | Ft. Ins. 8— 5 | 10-7 | 12— 9 11— 1 | 15 - 0 $13 - 0$ $10 - 9$ | 8-0 6-11 | 10— 7 9— 3 7— 6 | 13— 4 11— 9 9— 7 | $ \begin{array}{c} 16 - 1 \\ 14 - 0 \\ 11 - 7 \end{array} $ | 18—10 16— 5 13— 6 | 9-4 8-1 6-9 | 12—5 10—10 8—11 | 15— 7 13— 7 11— 3 | |
| IMUM ALLO | Having d stress i below THEN horizon | f==900 | Ft. Ins. 8—0 6—10 | 10— 1 8— 8 | $\frac{12}{10}$ | 14— 3 12— 5 10— 1 | 9 — 2 | 10— 0 8—10 7— 3 | 12— 9 11— 0 9— 1 | 15— 4 13— 4 11— 0 | 17-10 $15-7$ $12-10$ | 8—11 7— 9 6— 4 | 11— 9 10— 3 8— 5 | 14-10 $12-11$ $10-7$ | gth |
| MAXI | the build- allowable per square d, refer to | E=1,600,000 | Ft. Ins. 9—9 | 12— 5 11— 4 | $\frac{14-10}{13-7}$ | 17 - 6 $16 - 0$ $14 - 1$ | 8-7 | 11— 6 10— 5 9— 3 | 14— 6 13— 3 11— 7 | 17 - 6 $15 - 11$ $14 - 0$ | 20— 5 18— 7 16— 4 | 9-7 | 12 - 9 $11 - 7$ $10 - 3$ | 16 - 0 $14 - 7$ $12 - 11$ | of span len the piece— |
| | reference to the build- on page 1 the allowable of in pounds per square of timber used, refer to with the corresponding | E=1,400,000 | Ft. Ins. 9—4 | 11-9 | 14-4 | 16—10 15—4 13—5 | 8-3 | 11-0 10-0 8-10 | 13—10 12—7 11— 1 | 16— 9 15— 3 13— 5 | 19— 6 17—10 15— 9 | 9-18-4 | 12— 3 11— 1 9— 9 | 15-4 14-0 12-4 | tion of 1/860 oted for "E. strength of in b |
| | Deflection nined by the table clasticit, species below | $\mathbf{E} = 1,000,000 \mid \mathbf{E} = 1,200,000 \mid \mathbf{E} = 1,400,000 \mid \mathbf{E} = 1,600,000$ | Ft. Ins. 8—10 | $\frac{11}{10}$ | 13— 7 12— 5 | 15—11 14— 6 12—10 | 7-10 | 10-5 | 13-1 12-0 10-6 | 15—10 14— 6 12— 9 | 18— 6 16—11 14—10 | 8-9 7-11 7-0 | 11— 6 10— 6 9— 3 | 14— 7 13— 4 11— 9 | d on: deflection— lowable deflectional lasticity as not by bending ress in extrer |
| | Limited by I Having determing code or the modulus of inch for the the column value to determine the column to the column the column to the col | E=1,000,000 | Ft. Ins. 8— 4 | 10-7 | $\frac{12-9}{11-7}$ | 15-0 13-9 12-0 | 7-5 | 9—10 8—11 7—10 | 12— 5 11— 4 9—11 | 14—11 13— 7 12— 0 | 17— 6 15—11 14— 0 | 8-3-6-6-6 | 10—11 9—11 8— 9 | 13— 9 12— 6 11— 0 | "The lengths are based on: When limited by deflection— Maximum allowable deflection of 1/360 of span length. Modulus of elasticity as noted for "E." When determined by bending strength of the piece— Allowable stress in extreme fiber in bending as noted for "f." |
| | Spacing of Joists Center to Center in Inches | | 12 16 | 12 16 | 12 16 | 12 16 24 | 12 16 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | NOTE,—The len Whe |
| | Size of Joists (Nominal) in Inches | | 2 x 8 | 2 x 10 | 2 x 12 | 2 x 14 | 3 x 6 | 3 x 8 | 3 x 10 | 3 x 12 | 3 x 14 | 4x 6 | 4 x 8 | 4 x 10 | NO |

FLOOR JOIST SPANS (125 Pound Load)

| | | | | MAXIMUM | | ALLOWABLE LEN | LENGTHS BETWEEN | TEEN SUPPORTS | (Clear | Span) | | |
|---|--|----------------------------|---|---|-------------------------|--|--|--|---|-------------------------|---|---|
| Size of Joists (Nominal) in Inches | Spacing of Joists Center to Center in Inches | Having de species catress. | Having determined by reference to species of timber used, refer to t stress. THEN refer to the table and use the shorter of the two | Sp. reference to the buildin d, refer to the column to the tables on page of the two spans. | ans ng c bel | Limited by H code or the tal low with the and in the sa | or the table on page 1 the horizontal shear stress in pounds with the corresponding value to determine the span limited in the same manner determine the span of the joist limited | ar (Read Car the horizont value to det | Carefully) contal shear stres determine the s the span of the | | per square inch by the horizonts by its bending s | square inch for the the horizontal shear its bending strength |
| | | S=70 | S=75 | S=80 | S | 06=S | S=95 | S=100 | S=105 | S=110 | S=120 | S=125 |
| × | 122 | 7 | Ft. Ins. | H | Ft. Ins. 9—7 | Ft. Ins. | Ft. Ins. | Ft. Ins. | 7 | Ft. Ins. | 1 | 1 |
| x 10 | 12 16 | 10-0 | 10 8 - 8 | 111-5 | 12—1 9—2 | 12 9 8 9 8 9 8 | 13-7 | 14-4 | 15-0 | 15-8 | 17-1 | 17 9 6 |
| x 12 | 12 | $\frac{12-0}{9-1}$ | 171 | 111 | 111 | 111 | 111 | 111 | 111 | | 111 | 111 |
| x 14 | 12 16 24 | 14— 0 10— 7 7— 1 | 1111 | 1111 | 1171 | 1111 | 111 | 1111 | 171 | | 1111 | 1171 |
| 9 x | 12 16 | 9-7 | 10-2 | TI | 111 | 12— 4 | 13-0 | 13—8 | 14— 4 10— 9 | 111 | 111 | 117 |
| ∞ × | 12 16 24 | 12— 7 9— 7 6— 5 | 13— 6 10— 2 6—10 | 14— 5 10—10 7— 5 | 15— 4 11— 7 7— 9 | 16— 2 12— 4 8— 4 | 111 | 18— 0 13— 7 9— 2 | 18—10 14— 4 9— 7 | 1111 | 1111 | 1111 |
| x 10 | 12 16 24 | 15— 9 12— 0 8— 1 | 16—10 12—10 8—8 | 18—1 13—8 9—4 | 19— 2 14— 7 9— 9 | 20— 4 15— 5 10— 5 | 21— 6 16— 4 11— 0 | 22— 7 17— 2 11— 7 | 23—8 18—0 12—2 | 24— 9 18—10 12— 8 | 27— 1 20— 7 13—10 | 28— 2 21— 5 14— 6 |
| x 12 | 12 16 24 | 18—10 14— 5 9— 9 | | 21— 7 16— 6 11— 2 | 23— 0 17— 6 11—10 | 24— 5 18— 6 12— 6 | 25— 8 19— 7 13— 2 | 27— 1 20— 7 13—10 | 28— 5 21— 7 14— 7 | 29— 9 22— 8 15— 4 | 1111 | 25- 9 |
| x 14 | 12 16 24 | 22— 0 16— 9 11— 5 | 23— 7 18— 0 12— 2 | 25— 2 19— 2 13— 0 | 26— 8 20— 5 13— 9 | 28— 4 21— 7 14— 8 | 29—10 22— 9 15— 6 | 30— 0 24— 0 16— 4 | 25— 2 17— 1 | 26—5 | 28— 9 19— 6 | 111 |
| 9 x | 12 16 24 | 13—1 9—10 6—8 | 14— 0 10— 7 7— 1 | 14—10 11— 4 7— 7 | 15-10 $12-0$ $8-1$ | 16— 9 12— 8 8— 7 | 17— 8 13— 5 9— 0 | 18— 8 14— 1 9— 6 | 19— 7 14— 9 10— 0 | 20— 6 15— 7 10— 6 | 22— 5 17— 0 11— 5 | 23— 4 17— 8 11—10 |
| ∞ × | 12 16 24 | 17— 2 13— 1 8— 9 | 18— 5 14— 0 9— 5 | 19— 7 14—10 10— 1 | 20—10 15—10 10—8 | 22— 1 16— 9 11— 4 | 23— 4 17— 8 12— 0 | 24— 6 18— 7 12— 7 | 25— 9 19— 7 13— 2 | 117 | 1111 | 1111 |
| x 10 | 12 16 24 | 21— 5 16— 4 11— 1 | 23 - 0 $17 - 6$ $11 - 10$ | 24— 6 18— 8 12— 8 | 26— 0 19— 9 13— 6 | 27— 7 21— 0 14— 4 | 29— 1 22— 2 15— 0 | 30— 0 23— 4 15— 9 | 24— 6 | 25— 8 17— 5 | 28— 0 19— 0 | 29— 2 19— 9 |

NATIONAL LUMBER MANUFACTURERS ASSOCIATION

Page Sixteen

FLOOR JOIST SPANS (150 Pound Load)

| | | 95.15 | 800 | Ins 4 | 112 | -10 | C 60 | -111 | 62.00 | - 7 | 024 | - 5 | P-100 | 000 | 1112 | |
|--|-------------------|--|------------------------------------|---------------------|---------------------|----------------------|----------------------|--------------------|---------------------|---------------------------|-------------------------|--|--|-------------------------------------|---|---|
| | | extreme fibre to the column h of the joist. | f=1,800 | Ft. 10— | 13- | 13- | 18- | 6.8 | 13- | 147 | 20- 17- 14- | 23- 20- 16- | 11018 | 13-11 | 13-119-119-119-119-119-119-119-119-119-1 | |
| eiling. | | vable extrerrefer to the rength of the the joist lin | f=1,700 | Ft. Ins. 10— 1 8— 8 | $\frac{12-}{11-}$ | 15— 5 13— 5 | 18— 1 15— 9 | 8-7 | 12-10 $11-1$ | 16— 1 14— 0 11— 6 | 19— 5 16—11 13—11 | 22— 9 19—10 16— 4 | 11— 4 9—10 8—1 | 14—11 13— 0 10— 9 | 18—10 16—5 13—6 | uare foot). |
| stered O | | ly) te 1 the allowable timber used, refer to bending strength the span of the j | f=1,600 | Ft. Ins. 9—8 | 12— 5 10— 8 | $\frac{15}{13}$ | 17— 6 15— 3 | 9-4 | 12— 5 10—10 | 15— 9 13— 7 11— 3 | 18—10 16— 5 13— 6 | 22— 0 19— 3 15—10 | 10—11 9—6 7—10 | 14— 6 12— 7 10— 4 | 18-3 15-11 13-1 | (10 pounds per square foot), nds per square foot), rea with plastered ceiling, or ling unplastered. |
| Foot with Unplastered Ceiling | | (Rend Carefully) table on page and grade of tin limited by the ner determine th | f=1,500 | Ft. Ins. 9—5 | $\frac{12-0}{10-5}$ | 14— 5 12— 7 | 16—11 14—10 | 9-17-11 | $\frac{12-0}{10-5}$ | 15— 1 13— 3 10—10 | 18—3 15—11 13—1 | 21— 4 18— 7 15— 4 | 10— 7 9— 3 7— 6 | 14— 0 12— 3 10— 0 | 17— 9 15— 5 12— 9 | ng (10 pou pounds per or area with ceiling unp |
| ED e Foot w | (Clear Span) | Bending (Rend de or the table one species and g the span limit same manner de pans. | f=1,400 | Ft. Ins. 9—17—7—10 | 11-7 | $\frac{13-10}{12-2}$ | 16— 5 14— 3 | 8 - 9 | 11-7 | 14— 7 12— 9 10— 5 | $\frac{17-7}{15-5}$ | $\begin{array}{c} 20 - 7 \\ 18 - 0 \\ 14 - 10 \end{array}$ | 10-3 8-11 7-4 | 13— 7 11—10 9— 9 | 17 - 1 $14 - 11$ $12 - 3$ | joist. lath and plaster ceiling keness of flooring (5 pour per square foot of floor apper square foot with ceil |
| Y LOADED | SUPPORTS (| Determined by Bending (Rend the building code or the table place inch for the species and give to determine the span limit 17 and in the same manner deter of the two spans. | f=1,300 | Ft. Ins. 8— 9 | $\frac{11-1}{9-7}$ | 13— 5 11— 8 | $\frac{15-10}{13-9}$ | 8-5 | $\frac{11-4}{9-10}$ | 14— 1 12— 4 10— 0 | 17— 0 14—10 12— 3 | 19—10 17— 4 14— 3 | 9—10 8— 6 7— 0 | 13— 1 11— 5 9— 4 | 16— 6 14— 5 11—10 | Weight of joist. Weight of lath and Jouble thickness of for pounds per square 60 pounds per square |
| FORMI | BETWEEN SU | Spans Determined by reference to the building pounds per square inch for esponding value to determinable on page 17 and in the use the shorter of the two | f=1,200 | Ft. Ins. 8— 5 | 10-8 | $\frac{12-10}{11-2}$ | 15— 3 13— 3 | $\frac{8}{7-0}$ | $10 - 9 \\ 9 - 4$ | 13 - 6 $11 - 10$ $9 - 9$ | 16— 4 14— 3 11— 9 | 19 - 1 $16 - 7$ $13 - 9$ | 9— 6 8— 3 6—10 | 12 - 7 $10 - 11$ $9 - 0$ | $\begin{array}{c} 15-10 \\ 13-10 \\ 11-4 \end{array}$ | Weight of joist. Weight of lath and plaster ceiling (10 Double thickness of flooring (5 pounds 160 pounds per square foot of floor area 160 pounds per square foot with ceiling |
| 7 | | Spans Determined by Bending (Read Carefully) letermined by reference to the building code or the table on page I the allowable extreme fibre in bending in pounds per square inch for the species and grade of timber used, refer to the column with the corresponding value to determine the span limited by the bending strength of the joist. refer to the table on page I7 and in the same manner determine the span of the joist limited by the stear and use the shorter of the two spans. | f=1,100 | Ft. Ins. 8— 1 7— 0 | 10— 2 8—10 | 12— 5 10— 9 | 14— 6 12— 7 | 6 -9 | 10— 4 8—11 | 13 - 0 $11 - 4$ $9 - 4$ | $\frac{15-7}{13-7}$ | 18—4 15—11 13—1 | $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | 12 - 0 $10 - 6$ $8 - 7$ | 15-1 13-3 10-11 | Dead load- Live load- |
| 2 | ALLOWABLE LENGTHS | | f=1,000 | Ft. Ins. 7—8 6—8 | 8 - 8 | $\frac{11-9}{10-2}$ | $\frac{13-11}{12-0}$ | 7-5 | 9—10 8— 6 | 12 - 5 $10 - 10$ $8 - 10$ | 14—11 13— 0 10— 9 | 17— 5 15— 3 12— 6 | 8 — 9 6 — 3 6 — 3 | $\frac{11-5}{10-0}$ $\frac{8-3}{8}$ | 14— 5 12— 7 10— 4 | 100 |
| FOR FL | | Having d stress i below THEN horizon | f=900 | Ft. Ins. 7— 4 6— 5 | 9-4 | 11-2 | 13— 3 11— 5 | $\frac{7-0}{6-1}$ | 9— 4 8— 1 | 11— 9 10— 3 8— 5 | 14— 1 12— 4 10— 1 | 16 - 6 $14 - 5$ $11 - 11$ | 8-3 7-1 5-10 | 10-11 $9-6$ $7-9$ | 13 - 9 $11 - 11$ $9 - 10$ | length. |
| M SPANS vith Plaste | MAXIMUM | he build- allowable rs square refer to | E=1,600,000 | Ft. Ins. 9—2 8—5 | 11— 8 10— 8 | $\frac{14-2}{12-10}$ | 16— 7 15— 7 | 8-3 | 10—11 | 13— 9 12— 6 11— 0 | 16— 7 15— 1 13— 4 | 19 - 5 $17 - 9$ $15 - 6$ | 9-1 8-4 7-3 | $\frac{12}{11}$ $\frac{0}{9}$ | 15— 3 13—11 12— 3 | |
| MAXIMUM SPANS FOR FLOOR JOISTS Square Foot with Plastered Ceiling. Live Loa | | of 1/360 of the eference to the page 1 the in pounds puritimber used the timber corresponds an. | | Ft. Ins. 8—98—0 | $\frac{11-2}{10-2}$ | 13— 6 12— 4 | 15—11 14— 6 | $\frac{7-10}{7-1}$ | 10— 5. | 13 - 1 $12 - 0$ $10 - 6$ | 15—10 14— 6 12— 9 | 18— 6 16—11 14—11 | 8-9 7-11 6-11 | 11— 6 10— 6 9— 3 | 14— 6 13— 4 11— 9 | ion of 1/360 oted for "E." trength of the |
| Squ | | Limited by Deflection of 1/360 of the Span Having determined by reference to the building code or the table on page 1 the allowable modulus of elasticity in pounds per square inch for the species of timber used, refer to the column below with the corresponding value to determine span. | =1,000,000 E=1,200,000 E=1,400,000 | Ft. Ins. 8—5 | 10-7 | 12—10 11— 8 | 15— 1 13—10 | 6-9 | $9-11 \\ 9-0$ | 12— 6 11— 5 10— 0 | 15— 0 13— 9 12— 0 | 17 - 7 $16 - 1$ $14 - 1$ | 8-3 7-6 6-7 | 10—11 10— 0 8—10 | $\frac{13-10}{12-7}$ | deflection— wable deflect asticity as n by bending s |
| Live Load 150 Pounds per | | Limited b. Having detting code of modulus inch for the colum value to | = 1,000,000 E | Ft. Ins. 7—10 | 10-0 | 12— 1 11— 0 | 14— 3 13— 0 | 7-0 | 9-4 | 11— 9 10— 9 9— 5 | 14— 3 12—11 11— 4 | 16— 7 15— 1 13— 4 | 7-10 $7-1$ $6-3$ | 10— 4 9— 5 8— 3 | $\frac{13}{11}$ | The lengths are based on: When limited by deflection— Maximum allowable deflection of 1/360 of span Modulus of elasticity as noted for "E." When determined by bending strength of the piece— Allowable stress in extreme fibre in bending as |
| Live Load | | Spacing of Joists Center to Center in Inches | E E | 12 16 | 12 16 | 12 16 | 12 | 12 16 | 12 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | .—The |
| | | Size of Joists ((Nominal) in Inches | | 2 x 8 | 2 x 10 | 2 x 12 | 2 x 14 | 3 x 6 | 3 x 8 | 3 x 10 | 3 x 12 | 3 x 14 | 4 x 6 | 4 x 8 | 4 x 10 | NOTE |

FLOOR JOIST SPANS (150 Pound Load)

| Live L | Live Load 150 Pounds per | | MAXIMU Square Foot | UM | M SPANS FOR FLOOR JOISTS with Plastered Ceiling. Live Loa | N N | 0 | UNIFORMLY I | LOADED Square Fo | ot with Un | OADED Square Foot with Unplastered Ceiling | Ceiling. | |
|---|--------------------------|--|---|--|---|-------------------------|---|--|--|--|---|---|--|
| | o and a second | | | MAX | MAXIMUM ALLO | | LENGTHS BETV | BETWEEN SUPPORTS | (Clear | Span) | | | |
| Size of Joists (Nominal) in Inches | Center in Inches | Having de species stress. | Having determined by reference to species of timber used, refer to t stress. THEN refer to the table and use the shorter of the two | reference to the bed, refer to the conto the tables on of the two spans. | pa | or the with in the | d by Horizontal Shear (Read Carefully) the table on page 1 the horizontal shear h the corresponding value to determine the same manner determine the span of | tear (Read Car 1 the horizont g value to det determine the | Carefully) zontal shear stress in pounds o determine the span limited the span of the joist limited | | per square inch for the by the horizontal shear by its bending strength | square inch for the the horizontal shear its bending strength | |
| | | S=70 | S=75 | S=80 | S=85 | 06=S | S=95 | S=100 | S=105 | S=110 | S=120 | S=125 | |
| 2 x 8 | 12 16 | Ft. Ins. 6— 9 5— 1 | Ft. Ins. 7—25—6 | Ft. Ins. 7—8 5—9 | Ft. Ins. 8— 2 6— 2 | Ft. Ins. 8—8 6—6 | Ft. Ins. 9—2 6—10 | Ft. Ins. 9—8 | Ft. Ins. 10— 1 7— 7 | Ft. Ins. 10— 7 8— 0 | Ft. Ins. 11—7 | Ft. Ins. 12—1 9—1 | |
| 2 x 10 | 12 | 8 - 6 | 9-1 6-10 | 9-8 | 10—4 | 10—10 | 11-7 | 12-2 | 12— 9 9— 7 | 13— 5 10— 1 | $\frac{14-7}{11-0}$ | 15— 2 11— 6 | |
| 2 x 12 | 12 16 | 10— 2 7— 8 | 11-0 | 11— 8 8—10 | 12— 5 | $\frac{13-2}{10-0}$ | $\frac{13-10}{10-6}$ | 14— 7 11— 1 | 15- 5 | $\frac{16-1}{12-2}$ | 17— 7 13— 4 | 18— 4 13— 9 | |
| 2 x 14 | 12 | 11—10 9— 0 | 12— 9 9— 8 | 13-7 | 14— 6 11— 0 | 15— 4 11— 7 | 16— 2 12— 4 | 17— 0 12—10 | $\frac{17-10}{13-7}$ | 18— 9 14— 2 | 20— 6 15— 6 | 21— 4 16— 1 | |
| 3 x 6 | 12 | 8 6 6 2 | 86-8 | 9—4 | $\frac{9-10}{7-6}$ | 10—6 | 11-18-4 | 111-7 | 12— 2 9— 2 | 12- 9 | 14— 0 10— 6 | 14— 7 11— 0 | |
| 8 × 8 | 12 | 10-9 | 11-6 | 12— 4 | $\frac{13-1}{9-10}$ | 13— 9 10— 6 | 14-7 | 15- 5 | 16— 2 12— 2 | $\frac{16-10}{12-9}$ | 18— 6 14— 0 | 19— 2 14— 6 | |
| 3 x 10 | 12 16 24 | 13— 6 10— 2 6—10 | 14— 6 11— 0 7— 5 | 15— 5 11— 8 7—10 | 16— 5 12— 5 8— 5 | 17— 5 13— 2 8—10 | 18— 4 13—10 9— 5 | 19— 4 14— 7 9—10 | 20— 4 15— 5 10— 5 | 21— 2 16— 1 10— 9 | 23— 2 17— 7 11— 9 | 24— 1 18— 4 12— 4 | |
| 3 x 12 | 12 16 24 | 16— 2 12— 4 8— 4 | 17— 5 13— 2 8—10 | 18— 6 14— 1 9— 6 | 19—8 15—0 10—1 | 20—10 15— 9 10— 8 | 22— 0 16— 8 11— 4 | 23— 2 17— 7 11—10 | 24— 4 18— 6 12— 6 | 25— 6 19— 5 13— 1 | 27— 9 21— 1 14— 4 | 29— 0 22— 0 14—10 | |
| 3 x 14 | 12 16 24 | 18—10 14— 5 9— 8 | 20—2 15—5 10—5 | 21— 7 16— 5 11— 1 | 22—10 17— 5 11— 9 | 24— 4 18— 6 12— 6 | 25— 7 19— 6 13— 2 | 27— 0 20— 6 13—10 | 28— 4 21— 6 14— 7 | 29— 8 22— 7 15— 4 | 30— 0 24— 7 16— 8 | 25— 8 17— 5 | |
| 4 x 6 | 12 16 24 | 11— 2 8— 5 5— 8 | $\begin{array}{c} 11-10 \\ 9-0 \\ 6-1 \end{array}$ | 12— 8 9— 7 6— 6 | 13— 6 10— 2 6—10 | 14— 4 10— 9 7— 4 | $ \begin{array}{c} 15 - 1 \\ 11 - 5 \\ 7 - 8 \end{array} $ | 15-10 $12-1$ $8-1$ | 16— 8 12— 8 8— 6 | 17— 6 13— 4 8—10 | 19— 1 14— 6 9— 8 | 19—10 15— 1 10— 1 | |
| 4 x 8 | 12 16 24 | $\begin{array}{c} 14 - 8 \\ 11 - 1 \\ 7 - 6 \end{array}$ | 15 - 8 $11 - 10$ $8 - 0$ | 16— 9 12— 8 8— 7 | 17— 9 13— 6 9— 1 | 18—10 14— 4 9— 8 | 19-10 $15-1$ $10-2$ | $\begin{array}{c} 21 - 0 \\ 15 - 10 \\ 10 - 8 \end{array}$ | 22— 0 16— 8 11— 4 | 23— 1 17— 6 11— 9 | 25— 2 19— 1 12—10 | 26— 2 19—10 13— 5 | |
| 4 x 10 | 12 16 24 | 18— 5 14— 0 9— 6 | 19— 8 15— 0 10— 1 | $\begin{array}{c} 21 - 0 \\ 16 - 0 \\ 10 - 9 \end{array}$ | 22— 4 17— 0 11— 6 | 23— 7 18— 0 12— 2 | 24—10 19— 0 12— 9 | 26— 4 20— 0 13— 6 | 27— 7 21— 0 14— 2 | 28—10 22— 0 14—10 | 30— 0 24— 0 16— 2 | 25— 0 16—10 | |
| NOTE | | The lengths are based of Allowable horizontal s | on: shear stress a | as noted for " | "." "S" | Deg | Dead load—Weight of joist. Weight of lath and plaster ceiling (10 pounds per square foot). Double thickness of flooring (5 pounds per square foot). Live load—150 pounds per square foot of floor area with plastered ceiling, or 160 pounds per square foot with ceiling unplastered. | tht of joist. The of lath are ble thickness ounds per squared ounds of the squared ounds ound ounds ound ounds ound ound ound ound ound ound ound ound | nd plaster cei of flooring (5 lare foot of fl | ling (10 pour pounds per oor area with | nds per squar square foot). 1 plastered cei | e foot). | |

NATIONAL LUMBER MANUFACTURERS ASSOCIATION

CEILING AND ATTIC JOIST SPANS

| NAX | | | MAX | KIMUM ALLOW | MAXIMUM ALLOWABLE LENGTHS BETWEEN | | SUPPORTS (Clear Span) | Span) | |
|--------------------------|---|---|--|--|---|---|---------------------------------------|--|-----------------------|
| Size of Joists (Nominal) | Spacing of Joists Center to Center in Inches | Having in your | Limited by Deflection of 1/360 of the Span Having determined by reference to the building code or the table on page 1 the allowable modulus of elasticity in pounds per square inch for the species of timber used, refer to the column below with the corresponding value to determine maximum safe span. | Lim reference to the e inch for the sp maximum safe s | Limited by Deflection of 1/360 of the Span the building code or the table on page I e species of timber used, refer to the colu fe span. | of 1/360 of the r the table on pa | Span age I the allowal | ble modulus of e | asticity |
| | | | CEILING | 3 JOISTS | | ATTIC FL | OOR JOISTS-I | ATTIC FLOOR JOISTS-Live Load 20 lbs. per sq. ft. | per sq. ft. |
| | | E=1,000,000 | E=1,200,000 | E=1,400,000 | E=1,600,000 | E=1,000,000 | E=1,200,000 | E=1,400,000 | E=1,600,000 |
| 4 × 61 | 12 16 24 | Ft. Ins. 9— 4 8— 7 7— 7 | Ft. Ins. 10— 0 9— 2 8— 1 | Ft. Ins. 10— 6 9— 8 8— 6 | Ft. Ins. 11.0 10.0 8—11 | Ft. Ins. 6-6 5-11 5-3 | Ft. Ins. 7— 0 6— 3 5— 7 | Ft. Ins. 7— 4 6— 8 5—10 | Ft. Ins. 7—8 6—11 6—1 |
| 9 × N | 12 16 24 | 14-2 13-3 11-8 | 15— 5 14— 0 12— 5 | 15—10 14— 8 13— 0 | 16— 7 15— 4 13— 8 | 10— 0 9— 1 8— 1 | 9-98 | 11— 3 10— 2 9— 0 | |
| 2 x 8 | 12 16 24 | 18— 6 17— 2 15— 4 | 19— 8 18— 3 16— 4 | 20— 0 19— 3 17— 2 | 21— 8 20— 2 18— 0 | 13— 4 12— 1 10— 9 | 14—2 12—10 11—5 | 1711 | 1111 |
| 2 x 10 | 12 16 24 | 23— 0 21— 4 19— 3 | 24— 5 22— 9 20— 5 | 25— 8 24— 0 21— 6 | 26—10 25— 0 22— 6 | 16-9 15-3 13-7 | 17— 9 16— 2 14— 5 | 1111 | |
| 2 x 12 | 12 16 24 | 27— 2 25— 6 23— 0 | 28—11 27— 0 24— 5 | 30— 0 28— 6 25— 9 | 29— 9 26—10 | 20— 0 18— 4 16— 4 | 21— 4 19— 5 17— 4 | -111 | |
| NOTE.—TJ | NOTE.—The lengths are based on: Maximum allowable Modulus of elasticity Celling joists Dead load—Weight pounds per square Live load—None. | gths are based on: aximum allowable deflectiodulus of elasticity as no ing joists ead load—Weight of joi pounds per square foot). | Maximum allowable deflection of 1/360 of span length. Modulus of elasticity as noted for "E." Dead load—Weight of joists plus plaster ceiling (10 pounds per square foot). | span length. | Attic floor joi Dead load | Attic floor joists Dead load—Weight of joist. Weight of lath and plaster ceiling (10 pounds per square foot). | t. and plaster ceiss of flooring (2.1 | iling (10 pounds 5 pounds per squ | per square |

RAFTER SPANS (15 Pound Load_Group I Covering)

| | | | | | SP 0 | PANS FOR I | ANS FOR RAFTERS r more. Live Load 15 | | | ILY LOADED Square Foot. | | | | | |
|--|---|--|--|---|--|--------------------------|--|--|---|--|---|--|-----------------------------|---|----------------------------|
| | | | ~ | MAXIMUM A | BLE | UNSUPPORTED | | LENGTHS FROM | PLATE | TO RIDGE (| (Without Collar Beams) | lar Beams) | | | |
| Size of Rafters (Nominal) in inches | Spacing of Rafters Center to Center in Inches | Limited Having de ing code modulus inch the colutth the colutth value to | Limited by Deflection of aving determined by refering code or the table on I modulus of elasticity in inch for the species of tithe column below with value to determine span. | Limited by Deflection of 1/360 of the Span Having determined by reference to the build- ing code or the table on page 1 the allowable modulus of elasticity in pounds per square inch for the species of timber used, refer to the column below with the corresponding value to determine span. | the build- allowable per square d, refer to | Having fibre colum | determined stress in ber n below wit | Determined by reference to the building code or fibre stress in bending in pounds per square inch for the column below with the corresponding value to determine | nce to the unds per squesponding va | Determined building co uare inch fe | | ending the table on page species and grade of maximum safe span. | age 1 the le of lumber pan. | allowable used, ref | extreme er to the |
| | | E=1,000,000 | E=1,200,000 | E=1,200,000 E=1,400,000 E=1,600,000 | E=1,600,000 | f=900 | f=1,000 | f=1,100 | f=1,200 | f=1,300 | f=1,400 | f=1,500 | f=1,600 | f=1,700 | f=1,800 |
| 2 x 4 | 12 16 24 | Ft. Ins. 7—7 6—11 6—1 | Ft. Ins. 8— 0 7— 5 6— 6 | Ft. Ins. 8— 6 7— 8 6— 9 | Ft. Ins. 8—11 8—1 7—1 | Ft. Ins. 9—11 8—8 7—1 | Ft. Ins. 10— 4 9— 1 7— 6 | Ft. Ins. 10—11 9—6 7—11 | Ft. Ins. 11—5 10—0 8—2 | Ft. Ins. 11—11 10— 5 8— 7 | Ft. Ins. 12— 4 10— 9 8—10 | Ft. Ins. 12— 9 11— 2 9— 2 | Ft. Ins. 13— 2 111— 7 9— 6 | Ft. Ins. 13—7 11—10 9— 9 | Ft. Ins. 14— 0 12— 4 10— 1 |
| 2 x 6 | 12 16 24 | 11— 7 10— 8 9— 5 | 12— 5 11— 4 10— 0 | 13— 0 12— 0 10— 6 | 13— 7 12— 6 11— 0 | 15— 1 13— 2 11— 0 | 15—10 14— 0 11— 7 | 16— 8 14— 8 12— 2 | 17— 5 15— 4 12— 8 | 18—1 15—10 13—2 | 18— 9 16— 6 13— 8 | 19— 6 17— 1 14— 2 | 20— 1 17— 8 14— 7 | 20— 8 18— 2 15— 1 | 21— 4 18— 9 15— 6 |
| 2 × 8 | 12 16 24 | 15— 4 14— 1 12— 6 | 16— 4 15— 0 13— 2 | 17 - 1 $15 - 9$ $13 - 10$ | 17—10 16— 6 14— 7 | 19— 8 17— 5 14— 6 | 20— 9 18— 5 15— 4 | 21— 9 19— 4 16— 0 | 22— 9 20— 1 16— 8 | 23— 8 20—10 17— 5 | 24— 7 21— 8 18— 0 | 25— 6 22— 6 18— 8 | 26— 4 23— 4 19— 4 | $\begin{array}{c} 27 - 1 \\ 24 - 0 \\ 19 - 10 \end{array}$ | 27—10 24— 7 20— 6 |
| 2 x 10 | 12 16 24 | 19 - 2 $17 - 8$ $15 - 8$ | 20— 5 18— 9 16— 8 | 21— 6 19— 9 17— 6 | 22— 5 20— 8 18— 4 | 24— 6 21— 9 18— 2 | 25—10 22—10 19— 1 | 27— 1 24— 0 20— 1 | 28— 4 25— 1 21— 0 | 29— 6 26— 1 21— 9 | 30— 0 27— 1 22— 7 | 28— 1 23— 5 | 29— 0 | 29—10 25— 0 | 30-0 |
| 2 x 12 | 12 16 24 | 22 - 10 $21 - 2$ $18 - 10$ | 24— 5 22— 6 20— 0 | 25— 7 23— 8 21— 1 | 26— 9 24— 9 22— 1 | 29— 2 26— 0 21— 9 | 30— 0 27— 5 23— 0 | 28— 8 24— 1 | 30— 0 25— 1 | 26—2 | 27—2 | 28-1 | 29—0 | 29—10 | 30—0 |
| 2 x 14 | 12 16 24 | 26— 6 24— 7 22— 0 | 28— 1 26— 3 23— 5 | 29— 9 27— 6 24— 7 | 30— 0 28—10 25— 9 | 29—11 25— 3 | 30— 0 | 27—11 | 29— 1 | 30-0 | | | | | |
| 3 x 6 | 12 16 24 | 13— 5 12— 4 10—11 | 14— 3 13— 1 11— 7 | 14—11 13—10 12— 3 | 15— 7 14— 5 12—10 | 18— 6 16— 5 13— 9 | 19— 6 17— 4 14— 6 | 20— 6 18— 3 15— 3 | 21—5 18—11 15—10 | 22— 4 19— 9 16— 6 | 23— 1 20— 6 17— 1 | 23—11 21— 3 17— 9 | 24— 9 21—11 18— 4 | 25— 6 22— 7 18—10 | 26— 3 23— 3 19— 5 |
| 3 x 8 | 12 16 24 | 17— 6 16— 3 14— 5 | 18— 7 17— 3 15— 4 | 19— 6 18— 1 16— 1 | 20— 5 18—11 16—10 | 24 - 0 $21 - 5$ $18 - 0$ | 25— 4 22— 6 18—11 | 26— 6 23— 7 19—11 | 24— 9 24— 9 20—10 | 29— 0 25—11 21— 9 | 30— 0 26— 9 22— 5 | 27—7 | 28— 6 24— 0 | 29— 5 24— 9 | 30-0 |
| 3 x 10 | 12 16 24 | 21— 9 20— 3 18— 0 | 23— 1 21— 5 19— 3 | 24— 4 22— 7 20— 3 | 25— 5 23— 7 21— 1 | 29— 6 26— 6 22— 5 | 30— 0 27—11 23— 7 | 29— 4 24—10 | 30— 0 25—11 | 26—11 | 27—11 | 28—11 | 30— 0 | | |
| NOTE | -The | -The lengths are based on: When limited by deflection allowab Maximum allowab Modulus of elastic When determined by he Allowable stress in | on: effection— vable deffectio sticity as not y bending sti s in extreme | lengths are based on: When limited by deflection— Maximum allowable deflection of 1/360 of span length, Modulus of elasticity as noted for "E," When defermined by bending strength of the piece— Allowable stress in extreme fibre in bending as noted | span length. piece— ing as noted f | for "f." | Dead load Live load | | -Weight of roof joist. Weight of roof sheathing Weight of roof coverings -15 pounds per square foot | hing (2.5 po ings (2.5 po foot of roof | ounds per so ounds per s surface co | quare foot). quare foot). nsidered as | . (Group I. | (2.5 pounds per square foot). (2.5 pounds per square foot). of roof surface considered as acting normal to the surface. | urface. |

RAFTER SPANS (20 Pound Load-Group I Covering)

| | | | | Slope of 2 | O° or | Fe. | KAFTE ve Load | P | per Squa | ALY LOADED Square Foot. | | | | 1 | |
|-------------------------------------|---|---|---|--|---|-----------------------------|---|--|---|--|---|---|---------------------------|---------------------------|---------------------------|
| | | | - | MAXIMUM A | ALLOWABLE | UNSUPPO | RTED LEN | UNSUPPORTED LENGTHS FROM PLATE | A PLATE T | TO RIDGE (Without Collar Beams) | Without Coll | (ar Beams) | | | |
| Size of Rafters (Nominal) in Inches | Spacing of Rafters Center to Center in Inches | H | Limited by Deflection of 1/360 of the Span Having determined by reference to the building code or the table on page 1 the allowable modulus of elasticity in pounds per square inch for the species of timber used, refer to the column below with the corresponding value to determine span. | reference to on page 1 the y in pounds 1 y of timber user with the correspond. | the Span the build- allowable allowable d, refer to | Having fibre | determined stress in bel in below wit | Determined by Bending aving determined by Bending aving determined by reference to the building code or the table on page 1 the allowable extreme fibre stress in bending in pounds per square inch for the species and grade of lumber used, refer to the column below with the corresponding value to determine maximum safe span. | ce to the unds per sqi sponding va | Determined by Bending building code or the uare inch for the speci | by Bending de or the or the specie | table on pages and grade | age 1 the | allowable es | rtreme to the |
| | | E=1,000,000 | - | E=1,200,000 E=1,400,000 E=1,600 | E=1,600,000 | f=900 | f=1,000 | f=1,100 | f=1,200 | f=1,300 | f=1,400 | f=1,500 | f=1,600 | f=1,700 | f=1,800 |
| 2 x 4 | 12 16 24 | Ft. Ins. 7—1 6—6 5—7 | Ft. Ins. 7—6 6—9 6—0 | Ft. Ins. 7—10 7—2 6—4 | Ft. Ins. 8— 4 7— 6 6— 7 | Ft. Ins. 8—10 7—9 6—5 | Ft. Ins. 9—5 8—4 6—8 | Ft. Ins. 9—9 8—7 7—0 | Ft. Ins. 10— 4 9— 0 7— 5 | Ft. Ins. 10— 8 9— 4 7— 8 | Ft. Ins. 11—1 9—7 8—0 | Ft. Ins. 11—6 10—1 8—4 | Ft. Ins. 11—10 10— 5 8— 6 | Ft. Ins. 12— 3 10— 8 8— 9 | Ft. Ins. 12— 7 11— 0 9— 1 |
| 2 x 6 | 12 16 24 | 10— 9 9—10 8— 8 | 11— 6 10— 7 9— 8 | 13— 5 11— 1 9—10 | 12— 8 11— 7 10— 4 | $\frac{13-7}{11-10}$ 9-9 | 14— 5 12— 7 10— 2 | 15 - 0 $13 - 2$ $10 - 10$ | 15-8 13-9 11-5 | 16— 5 14— 5 11—10 | 17— 0 14— 9 12— 3 | 17—7 15—5 12—8 | 18-1 15-10 13-1 | 18-8 16-5 13-7 | 19 - 2 $16 - 10$ $14 - 0$ |
| 2 x 8 | 12 16 24 | 14— 4 13— 2 11— 7 | 15— 2 14— 0 12— 4 | 16— 1 14— 8 13— 0 | 16—9 15—5 13—7 | 17—10 15— 8 13— 0 | 18—10 16— 7 13— 8 | 19— 9 17— 5 14— 5 | 20— 8 18— 2 15— 1 | 21— 6 18—10 15— 8 | 22— 3 19— 6 16— 3 | 23— 1 20— 4 16— 9 | 23—10 21— 0 17— 5 | 24— 7 21— 8 17—10 | 25— 4 22— 4 18— 5 |
| 2 x 10 | 12 16 24 | $ \begin{array}{r} 18 - 0 \\ 16 - 7 \\ 14 - 7 \end{array} $ | $\frac{19-1}{17-7}$ $\frac{15-7}{15-7}$ | 20— 1 18— 6 16— 5 | 21— 0 19— 5 17— 1 | 22— 4 19— 8 16— 5 | 23— 6 20— 9 17— 4 | 24— 8 21— 9 18— 1 | 25— 9 22— 9 18—10 | 26— 9 23— 8 19— 8 | 27— 8 24— 6 20— 5 | 28— 9 25— 6 21— 2 | 29— 8 26— 4 21—10 | 30— 0 27— 1 22— 6 | 27—10 23— 2 |
| 2 x 12 | 12 16 24 | $\begin{array}{c} 21 - 7 \\ 19 - 10 \\ 17 - 7 \end{array}$ | $\begin{array}{c} 22 - 10 \\ 21 - 1 \\ 18 - 8 \end{array}$ | 24— 1 22— 4 19— 8 | 25— 2 23— 4 20— 7 | 26— 7 23— 7 19— 8 | 28— 1 24—10 20— 9 | 29— 6 26— 1 21— 9 | 30— 0 27— 2 22— 8 | 28-5 | 29— 5 24— 6 | 30-0 | 26- 4 | 27-1 | 27—10 |
| 2 x 14 | 12 16 24 | 25— 0 23— 3 20— 7 | 26— 7 24— 7 21—11 | 28— 0 25—11 23— 1 | 29— 4 27— 1 24— 1 | 30— 0 27— 4 23— 1 | 28—10 24— 1 | 30-0 | 26— 5 | 27— 6 | 28— 6 | 29— 7 | 30-0 | | |
| 3 x 6 | 12 16 24 | 12— 6 11— 6 10— 3 | 13— 4 12— 4 10—10 | 14 - 0 $12 - 11$ $11 - 5$ | 14— 9 13— 6 11—11 | 16—11 14—11 12— 5 | 17-10 $15-9$ $13-0$ | 18— 9 16— 6 13— 9 | 19— 6 17— 3 14— 4 | 20— 4 17—10 14—11 | 21— 0 18— 6 15— 5 | $\begin{array}{c} 21 - 10 \\ 19 - 3 \\ 16 - 0 \end{array}$ | 22— 6 19—10 16— 6 | 23— 3 20— 5 17— 0 | 23—11 21— 0 17— 6 |
| 80 × 80 | 12 16 24 | 16-5 | 17— 6 16— 3 14— 4 | 18— 5 17— 0 15— 1 | 19 - 3 $17 - 10$ $15 - 10$ | 21—11 19— 5 16— 4 | 23 - 1 $20 - 6$ $17 - 1$ | 24— 3 21— 6 18— 0 | 25— 4 22— 6 18—10 | 26— 6 23— 6 19— 9 | 27— 4 24— 4 20— 4 | 28— 4 25— 1 21— 0 | 29—3 25—11 21—9 | 30— 0 26— 9 22— 5 | 27— 6 |
| 3 x 10 | 12 16 24 | 20— 6 19— 0 16—11 | 21—10 20— 3 18— 0 | 22—11 21—4 18—11 | 24— 0 22— 3 19—10 | 27— 1 24— 3 20— 4 | 28— 7 25— 6 21— 5 | 30— 0 26— 9 22— 6 | 27—11 23— 6 | 29— 1 24— 6 | 30—0 | 26- 4 | 27— 1 | 28-0 | 28—10 |
| NOTE.—The | —The lengths When I Mos When d Ank | lengths are based on: When limited by deflect Maximum allowabl Modulus of elastici When determined by b | lengths are based on: When limited by deflection— Maximum allowable deflection of 1/360 of span length. Modulus of elasticity as noted for "E." When determined by bending strength of the piece— Allowable stress in extreme fibre in bending as noted for "f." | n of 1/360 of d for "E." ength of the ifibre in bendi | span length. piece— ng as noted | for "f." | Dead load- Live load- | | f roof joist. f roof sheat f roof cover per square | hing (2.5 points (| ounds per si unds per st f surface co | -Weight of roof joist. Weight of roof sheathing (2.5 pounds per square foot). Weight of roof coverings (2.5 pounds per square foot). (Group I.) | (Group I.) | nal to the s | arface. |

RAFTER SPANS (30 Pound Load-Group I Covering)

| | 11 | 1 | | 1. | | | ound 1 | 1 | Toup I | 1 | 1 | 1 | 11 |
|--------------------------------|------------------------------|--|---|--------------------------|---------------------------|-------------------------|---------------------------|-------------------------|-------------------------|---|--|---|--|
| | | extreme r to the | f=1,800 | Ft. Ins. 10— 9 9— 5 7— 8 | 1117 | 21—10 19— 1 15— 9 | 27— 4 24— 0 19—10 | 28—10 23—11 | 27—10 | 20— 7 18— 1 15— 0 | 26—11 23— 9 19— 9 | 29— 9 24—10 | mal |
| | | 1 the allowable extreme lumber used, refer to the | f=1,700 | Ft. Ins. 10— 5 9— 1 7— 6 | 16— 1 14— 0 11— 6 | 21— 2 18— 7 15— 4 | 26— 6 23— 4 19— 3 | 28— 0 23— 3 | 27— 0 | 20— 0 17— 7 14— 6 | 26— 3 23— 1 19— 3 | 28—10 24— 1 | (Group I.) |
| | ans) | age 1 the le of lumbe | f=1,600 | Ft. Ins. 10— 2 8—10 7— 3 | 1111 | 20— 7 18— 0 14—10 | 25— 9 22— 8 18— 8 | 30— 0 27— 2 22— 6 | 26— 3 | 19— 5 17— 1 14— 1 | 25— 5 22— 5 18— 7 | 28-0 | uare foot). uare foot). onsidered a |
| | RIDGE (Without Collar Beans) | table on I | f=1,500 | Ft. Ins. 9—11 8—6 7—0 | 15 - 1 $13 - 2$ $10 - 10$ | 19—11 17— 5 14— 5 | 24—11 21—11 18— 1 | 29—10 26—3 21—10 | 30— 0 25— 5 | 18—10 16— 6 13— 9 | 24— 7 21— 9 18— 0 | $\begin{array}{c} 30 - 0 \\ 27 - 1 \\ 22 - 7 \end{array}$ | unds per sq unds per sq of surface c |
| LOADED | DGE (Witho | Determined by Bending building code or the uare inch for the speci- | f=1,400 | Ft. Ins. 9—7 | 1111 | 19—2 16—10 13—10 | 24— 1 21— 2 17— 6 | 28—10 25— 4 21— 1 | 29— 9 24— 6 | 18—3 15—11 13—3 | 23— 9 21— 0 17— 5 | 29— 6 26— 3 21—10 | ning (2.5 po ings (2.5 po foot of roc |
| -UNIFORMLY oer Square Foot | PLATE TO RI | Determined building countries inch falle to dete | f=1,300 | Ft. Ins. 9—2 7—11 6—7 | | 18— 6 16— 3 13— 4 | 23— 3 20— 5 16—11 | 27— 9 24— 6 20— 3 | 28— 9 23— 7 | 17— 6 15— 5 12— 9 | 23— 0 20— 4 16—11 | 28— 6 25— 3 21— 0 | -Weight of roof joist. Weight of roof sheathing (2.5 pounds per square foot). Weight of roof coverings (2.5 pounds per square foot). 90 pounds per square foot of roof surface considered as acting normal to the surface. |
| S_UNIF | FROM | Determined by Bending on page fibre stress in bending in pounds per square inch for the species and grade of column below with the corresponding value to determine maximum safe span. | f=1,200 | Ft. Ins. 8 7 8 6 3 6 3 | 1111 | 17-10 $15-7$ $12-10$ | 22— 3 19— 7 16— 3 | 26— 8 23— 6 19— 6 | 30— 0 27— 6 22— 9 | $ \begin{array}{c} 16-10 \\ 14-10 \\ 12-3 \end{array} $ | 22— 0 19— 5 16— 1 | 27— 4 24— 3 20— 3 | |
| RAFTERS_U 30 Pounds per | LENGTHS | d by refere ending in po | f=1,100 | Ft. Ins. 8— 5 7— 4 6— 0 | 1711 | 17— 0 15— 0 12— 4 | 21— 4 18— 9 15— 6 | 25— 7 22— 6 18— 8 | 29— 6 26— 5 21— 9 | 16— 1 14— 1 11— 9 | 21— 0 18— 7 15— 5 | 26— 3 23— 3 19— 5 | Dead load |
| ANS FOR Live Load | UNSUPPORTED | determine stress in be an below wi | f=1,000 | Ft. Ins. 8— 0 7— 0 5— 9 | 1117 | 16— 3 14— 3 11— 9 | 20— 4 17—11 14—10 | 24— 5 21— 6 17—10 | 28— 3 25— 1 20— 9 | 15— 4 13— 6 11— 1 | 20— 1 17— 9 14— 9 | 25— 0 22— 1 18— 6 | |
| SP. | ABLE UNST | Having fibre | f=900 | Ft. Ins. 7—8 6—8 6—8 5—5 | 1111 | 15— 5 13— 6 11— 2 | 19— 4 17— 0 14— 0 | 23— 1 20— 4 16—11 | 26—9 23—10 19—9 | $\frac{14-7}{12-10}$ $\frac{12-10}{10-7}$ | $ \begin{array}{c} 19 - 1 \\ 16 - 10 \\ 14 - 0 \end{array} $ | 23 - 9 $21 - 0$ $17 - 6$ | length. |
| MAXIMUM Slope of 20° or mon | ALLOW | of the Span to the build- the allowable ds per square used, refer to corresponding | E=1,600,000 | Ft. Ins. 7—6 6—10 6—0 | 11—6 10—6 9—3 | 15— 3 14— 0 12— 3 | 19— 2 17— 6 15— 6 | 23— 0 21— 2 18— 8 | 26— 9 24—10 21—10 | 13— 4 12— 3 10—10 | 17— 6 16— 1 14— 3 | 21-11 $20-3$ $17-11$ | |
| Slope | MAXIMUM | Limited by Deflection of 1/360 of the Span aving determined by reference to the building code or the table on page 1 the allowable modulus of elasticity in pounds per square inch for the species of timber used, refer to the column below with the corresponding value to determine span. | E=1,400,000 | Ft. Ins. 7— 2 6— 6 5— 8 | 11 - 0 $10 - 1$ $8 - 10$ | 14— 7 13— 4 11— 9 | 18— 4 16—10 14—10 | 22— 0 20— 3 17—10 | 25— 6 23— 9 20—10 | 12 - 9 $11 - 9$ $10 - 4$ | 16-10 $15-5$ $13-7$ | 21 - 0 $19 - 4$ $17 - 1$ | tion of 1/360 oted for "E." strength of the |
| | | Limited by Deflection of 1/360 Having determined by reference ing code or the table on page 1 modulus of elasticity in pouncinch for the species of timber the column below with the value to determine span. | E=1,200,000 | Ft. Ins. 6—9 6—2 5—5 | 10- 5 9- 7 8- 5 | 13—10 12— 9 11— 2 | 17 - 5 $15 - 11$ $14 - 0$ | 20—11 19— 3 17— 0 | 24— 4 22— 6 19—10 | 12 - 1 $11 - 1$ $9 - 10$ | 15—11 14— 7 12—11 | 20— 0 18— 4 16— 4 | don: deflection— owable deflec insticity as n by bending i |
| | | Limited by I Having deterning code or t modulus of inch for the the column value to det | $\mathbf{E} = 1,000,000$ $\mathbf{E} = 1,200,000$ $\mathbf{E} = 1,400,000$ $\mathbf{E} = 1,600,000$ | Ft. Ins. 6— 5 5—10 5—1 | 9—10 9—0 7—11 | 13—1 11—11 10—6 | 16— 4 15— 0 13— 4 | 19— 8 18— 1 15—11 | 22—10 21— 3 18— 7 | 11 - 5 $10 - 5$ $9 - 3$ | 15— 0 13—10 12— 3 | 18— 9 17— 4 15— 4 | -The lengths are based on: When limited by deflection— Maximum allowable deflection of 1/360 of span Modulus of elasticity as noted for "E." When determined by bending strength of the piece— Allowable stress in extreme fibre in bending as |
| | | Spacing of Rafters Center to Center in Inches | 107 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | 12 16 24 | NOTE,—The leng |
| | | Size of Rafters (Nominal) in Inches | | 2x 4 | 2 x 6 | 2 x 8 | 2 x 10 | 2 x 12 | 2 x 14 | 3 x 6 | 8 x 8 | 3 x 10 | NO |

NATIONAL LUMBER MANUFACTURERS ASSOCIATION.

RAFTER SPANS (40 Pound Load-Group I Covering)

| | Foot |
|--|--|
| ADED | Square |
| LO | per |
| DRMLY | Slope of 20° or more. Live Load 40 Pounds per Square Foot. |
| IF(| 40 |
| NO- | Load |
| TERS | Live |
| RAF | more. |
| OB | or |
| SH | 200 |
| Z | of |
| SP | ope |
| MAXIMUM SPANS FOR RAFTERS_UNIFORMLY LOADED | SI |
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| AL L | | | | MAXIMUM | ALLOWABLE | 11 | UNSUPPORTED I | LENGTHS | FROM PLATE | TO | RIDGE (Without | Collar | Beams) | | |
|------------------------------------|---|---|--|---|---|---------------------------------------|--|---|--|--|---|-------------------------|-------------------------|--------------------------|-------------------------|
| Size of Rafters (Nominal in Inches | Spacing of Rafters Center to Center in Inches | Limited Having defing code modulus inch colur the colur value to | ited by Deflection of g determined by refe code our the table on i ulus of elasticity in for the species of th column below with | 1/360 erence page 1 poun imber the | of the Span to the build- the allowable ds per square used, refer to corresponding | Having fibre colum | aving determined fibre stress in becolumn below wii | determined by reference to th tress in bending in pounds per n below with the corresponding | to the s per nding | | d by Bending code or the for the specie | table on less and gra | | allowable r used, ref | extreme er to the |
| FACT | N° 12 | E=1,000,000 | 0 E=1,200,000 | E=1,200,000 E=1,400,000 | E=1,600,000 | f=900 | f=1,000 | f=1,100 | f=1,200 | f=1,300 | f=1,400 | f=1,500 | f=1,600 | f=1,700 | f=1,800 |
| × co | 12 16 24 | Ft. Ins. 5— 9 5— 4 4— 8 | Ft. Ins. 6—2 5—8 5—0 | Ft. Ins. 6— 6 6— 0 5— 2 | Ft. Ins. 6—9 6—2 5—5 | Ft. Ins. 6—8 5—10 4—9 | Ft. Ins. 7—1 6—1 5—0 | Ft. Ins. 7—5 6—5 5—2 | Ft. Ins. 7— 9 6— 8 5— 6 | Ft. Ins. 8—1 7—0 5—9 | Ft. Ins. 8— 5 7— 4 6— 0 | Ft. Ins. 88—87—7 | Ft. Ins. 9— 0 7— 9 6— 5 | Ft. Ins. 9— 2 8— 0 6— 7 | Ft. Ins. 9—6 8—4 6—9 |
| 9 × % | 12 16 24 | 9-0 8-2 7-2 | 9-7 8-7 8-8 | 10—1 8—10 8—1 | 10—7 9—8 8—6 | 10-2 | 10—10 9—6 7—9 | 11— 5 10— 0 8— 2 | 12— 0 10— 5 8— 7 | 12— 5 10—10 8—10 | 12—10 11— 4 9— 3 | 13— 5 11— 8 9— 7 | 13— 9 12— 0 9—10 | 14— 2 12— 5 10— 2 | 14— 7 12— 9 10— 6 |
| % X & X | 12 16 24 | 12 - 0 $11 - 0$ $9 - 7$ | 12— 9 11— 8 10— 2 | 13— 5 12— 4 10— 9 | 14— 0 12— 9 11— 4 | 13— 8 12— 0 9—10 | 14— 5 12— 7 10— 5 | 15— 1 13— 2 10—10 | 15— 9 13— 9 11— 5 | 16— 6 14— 5 11— 9 | 17 - 1 $14 - 10$ $12 - 4$ | 17— 8 15— 5 12— 8 | 18— 4 16— 0 13— 1 | 18— 9 16— 5 13— 7 | 19— 5 16—10 14— 0 |
| 2×10 | 12 16 24 | 15— 1 13— 9 12— 2 | 16— 1 14— 8 12—10 | $ \begin{array}{c} 16-10 \\ 15-6 \\ 13-7 \end{array} $ | 17— 8 16— 2 14— 2 | 17— 2 15— 1 12— 5 | 18— 1 15—10 13— 1 | 19— 0 16— 8 13— 8 | 19—10 17— 5 14— 4 | 20— 8 18— 1 15— 0 | 21— 6 18— 9 15— 6 | 22— 2 19— 5 16— 0 | 23— 0 20— 1 16— 7 | 23— 8 20— 8 17— 1 | 24— 4 21— 4 17— 7 |
| 2 x 12 | 12 16 24 | 18— 2 16— 8 14— 8 | 19— 4 17— 8 15— 7 | 20— 5 18— 8 16— 5 | 21— 4 19— 6 17— 2 | 20— 7 18— 1 15— 0 | 21— 9 19— 1 15— 9 | 22— 9 20— 0 16— 7 | 23— 9 20—10 17— 4 | 24— 9 21— 9 18— 0 | 25— 8 22— 7 18— 8 | 26— 8 23— 5 19— 4 | 27— 6 24— 2 20— 0 | 28— 5 24—10 20— 7 | 29— 2 25— 7 21— 2 |
| 2 x 14 | 12 16 24 | 21— 3 19— 6 17— 3 | 22— 7 20—10 18— 4 | 23—10 21—10 19— 4 | 24—10 22—10 20— 1 | 24 - 0 $21 - 1$ $17 - 6$ | 25— 4 22— 3 18— 6 | 26— 6 23— 4 19— 5 | 27— 9 24— 5 20— 3 | 28—10 25— 5 21— 0 | 30— 0 26— 4 21—10 | 27—3 | 28— 1 23— 5 | 29— 0 24— 1 | 29—10 24—10 |
| 3 x 6 | 12 16 24 | 10—6 9—7 8—6 | 11— 3 10— 4 9— 0 | $11-10 \\ 10-10 \\ 9-6$ | 12— 4 11— 4 9—11 | $\frac{13-0}{11-5}$ $\frac{9-5}{9-5}$ | 13— 9 12— 0 9—11 | 14— 5 12— 7 10— 5 | 15-0 13-1 10-11 | 15— 7 13— 9 11— 4 | 16— 3 14— 3 11— 9 | 16—10 14— 9 12— 1 | 17— 4 15— 3 12— 6 | 17—11 15—7 12—11 | 18— 5 16— 1 13— 4 |
| & × % | 12 16 24 | 13—11 12—10 11— 3 | 14—10 13— 6 12— 0 | 15— 7 14— 4 12— 7 | 16— 4 14—11 13— 3 | 17 - 1 $15 - 0$ $12 - 5$ | 18-0 15-10 13-1 | 18—11 16—7 13— 9 | 19— 9 17— 4 14— 5 | 20— 7 18— 1 15— 0 | 21— 4 18— 9 15— 6 | 22— 0 19— 4 16— 0 | 22—10 20— 0 16— 7 | 23— 6 20— 7 17— 1 | 24— 1 21— 3 17— 6 |
| 3 x 10 | 12 16 24 | 17— 6 16— 1 14— 3 | 18— 6 17— 0 15— 1 | 19— 6 17—11 15—10 | 20— 5 18—10 16— 7 | 21— 4 18—10 15— 7 | 22— 5 19—10 16— 6 | 23— 7 20—10 17— 4 | 24— 7 21— 9 18— 0 | 25— 7 22— 7 18—10 | 26— 7 23— 5 19— 6 | 27— 6 24— 3 20— 1 | 28— 5 25— 0 20—10 | 29— 4 25—10 21— 5 | 30— 0 26— 7 22— 1 |
| NOTE. | —The lengths are based When limited by d Maximum alloy Modulus of els When determined l Allowable stree | a are based comitted by definition allow inlus of elast etermined by wable stress | on: wable deflection saticity as note by bending stre ss in extreme f | When limited by deflection— Maximum allowable deflection of 1/360 of span length. Modulus of elasticity as noted for "E." When determined by bending strength of the piece— Allowable stress in extreme fibre in bending as noted | span length. piece— ing as noted for | "J" 10; | Dead load | | f roof joist. f roof sheat f roof cove | -Weight of roof joist. Weight of roof sheathing (2.5 pounds per square foot). Weight of roof covering (2.5 pounds per square foot). (Group I.) 40 pounds per square foot of roof surface considered as acting normal to the surface. | ounds per so unds per so f surface co | quare foot). | (Group I. |) mal to the | surface. |

NATIONA

RAFTER AND ROOF JOIST SPANS (20 Pound Load-Group II Covering)

| | | | MAXII | MUM SPA. | MAXIMUM SPANS FOR R Any slope. | AFTE | AND ad 20 | ROOF JOISTS Pounds per Squ | 13 | UNIFORMLY re Foot | Y LOADED | GD GD | | | |
|---|--|---|---|---|--|--------------------------|--|---|--|--|--|--|-----------------------------------|---|---|
| | | | MA | MAXIMUM ALL | ALLOWABLE LI | LENGTHS B | BETWEEN S | SUPPORTS | OR FROM | PLATE TO | RIDGE | (Without Co | Collar Beams) | - | |
| Size of Joists or Rafters (Nominal) in Inches | Spacing of Joists or Rafters Center to Center in Inches | Limited Having de ing code modulus; inch for the columbalue to value to | Limited by Deflection of 1/360 of the Span Having determined by reference to the building code or the table on page 1 the allowable modulus of elasticity in pounds per square inch for the species of timber used, refer to the column below with the corresponding value to determine span. | by Deflection of 1/360 of the Span stermined by reference to the build or the table on page 1 the allowab of elasticity in pounds per square, the species of timber used, refer 1 mm below with the corresponding determine span. | the Span the build- allowable per square d, refer to responding | Having fibre colum | determined stress in be n below wi | Having determined by reference to the fibre stress in bending in pounds per column below with the corresponding | nce to the ounds per sq sponding va | | Determined by Bending building code or the uare inch for the speci. Lue to determine maxin | iding the table on I species and gra aaximum safe s | page 1 the de of lumbe pan. | 1 the allowable extreme lumber used, refer to the | extreme to the |
| 2 1 1 1 1 | | E=1,000,000 | E=1,200,000 | E=1,200,000 E=1,400,000 | E=1,600,000 | f=900 | f=1,000 | f=1,100 | f=1,200 | f=1,300 | f=1,400 | f=1,500 | f=1,600 | f=1,700 | f=1,800 |
| 2 x 4 | 12 16 24 | Ft. Ins. 6— 7. 6— 0. 5— 4 | Ft. Ins. 7—0 6—5 5—7 | Ft. Ins. 7— 5 6— 9 5—10 | Ft. Ins. 7— 9 7— 1 6— 2 | Ft. Ins. 8—17—15—9 | Ft. Ins. 8—7 7—5 6—2 | Ft. Ins. 9— 0 7— 9 6— 5 | Ft. Ins. 9— 5 8— 1 6— 8 | Ft. Ins. 9—8 8—6 7—0 | Ft. Ins. 10— 1 8— 9 7— 2 | Ft. Ins. 10— 6 9— 1 7— 6 | Ft. Ins. 10— 9 9— 5 7— 9 | Ft. Ins. 11— 1 9— 8 8— 0 | Ft. Ins. 11—6 10—0 8—2 |
| 2 x 6 | 12 16 24 | 10— 2 9— 4 8— 2 | 10—10 9—10 8—8 | 11— 5 10— 6 9— 2 | 12 - 0 $10 - 10$ $9 - 7$ | 12 - 5 $10 - 10$ $9 - 0$ | 13—1 11—5 9—5 | 13— 9 12— 0 9—10 | 14— 4 12— 7 10— 4 | 15 0 13 1 10 9 | 15— 6 13— 7 11— 2 | 16— 0 14— 1 11— 7 | 16— 7 14— 6 12— 0 | 17— 1 15— 0 12— 4 | 17—7 15—5 12—8 |
| 22 X 8 | 12 16 24 | 13— 6 12— 5 10—10 | 14— 5 13— 2 11— 7 | 15— 1 13—10 12— 2 | 15— 9 14— 6 12— 9 | 16— 5 14— 5 11—10 | 17— 4 15— 2 12— 6 | 18—1 15—10 13—1 | 18—10 16—7 13—8 | 19— 8 17— 4 14— 4 | 20— 5 17—10 14— 9 | 21— 1 18— 7 15— 4 | 21— 9 19— 2 15— 9 | 22— 6 19— 9 16— 4 | 23— 2 20— 4 16— 9 |
| 2 x 10 | 12 16 24 | 17— 0 15— 7 13— 9 | 18— 1 16— 7 14— 7 | 19— 0 17— 6 15— 5 | 19—10 18— 4 16— 1 | 20— 6 18— 4 15— 0 | 21— 7 19— 4 15— 9 | 22— 7 20— 2 16— 6 | 23— 8 21— 1 17— 2 | 24— 7 21—10 18— 0 | 25— 6 22— 8 18— 8 | 26— 6 23— 6 19— 4 | 27— 4 24— 4 19—10 | 28— 2 25— 1 20— 6 | 250 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 |
| 2 x 12 | 12 16 24 | 20— 5 18— 9 16— 7 | 21— 8 20— 6 17— 7 | 22— 9 21— 0 18— 7 | 23—10 22— 0 19— 5 | 24— 6 21— 7 18— 0 | 25— 9 22— 9 19— 0 | 27— 1 23—10 19—10 | 28— 4 25— 0 20— 9 | 29— 5 26— 0 21— 7 | 30— 0 27— 0 22— 5 | 27—10 23— 2 | 28— 9 24— 0 | 29— 8 24— 8 | 20 Poun |
| 2 x 14 | 12 16 24 | 23— 9 22—11 19— 5 | 25— 3 24— 4 20— 7 | 26— 6 25— 7 21— 9 | 27— 9 26—10 22— 9 | 28— 4 26—11 21— 0 | 29—10 28— 4 22— 1 | 30— 0 29— 9 23— 3 | 30-0 | 25 - 3 | 26-1 | 27— 0 | 27—11 | 28—10 | 29— 7 |
| 3 x 6 | 12 16 24 | 11 - 10 $10 - 11$ $9 - 7$ | 12— 7 11— 7 10— 3 | 13— 3 12— 3 10— 9 | 13—10 12— 9 11— 3 | 15— 6 13— 7 11— 4 | 16— 4 14— 5 11—11 | 17— 1 15— 1 12— 6 | 17—11 15— 8 13— 0 | 18-7 16-5 13-7 | 19— 4 17— 0 14— 1 | 20-0 17-7 14-7 | 20— 7 18— 3 15— 0 | 21— 4 18— 9 15— 6 | 21—11 19—4 16—10 |
| 80 80 | 12 16 24 | 15— 7 14— 4 12— 9 | 16— 7 15— 3 13— 6 | 17— 5 16— 1 14— 3 | 18—3 16—10 14—11 | 20— 3 17—11 14—11 | 21— 4 18—10 15— 9 | 22— 4 19— 9 16— 5 | 23— 4 20— 7 17— 3 | 24— 5 21— 7 18— 0 | 25— 3 22— 4 18— 6 | 26— 1 23— 1 19— 3 | 26—11 23—10 19—10 | 27— 9 24— 6 20— 5 | 28— 6 25— 4 21— 0 |
| 3 x 10 | 12 16 24 | 19— 5 18— 0 16— 0 | 20— 9 19— 1 17— 0 | 21—10 20—1 17—11 | 22—10 21— 1 18— 9 | 25— 1 22— 4 18— 7 | 26— 5 23— 6 19— 7 | 27— 9 24— 7 20— 7 | 28—11 25— 9 21— 6 | 30— 0 26—10 22— 5 | 27—10 23— 3 | 28— 9 | 29— 9 24—10 | 30-0 | 26 5 |
| 3 x 12 | 12 16 24 | 23— 3 21— 6 19— 3 | 24— 9 22—11 20— 5 | 26— 0 24— 1 21— 5 | 27— 3 25— 3 22— 5 | 29— 9 26— 6 22— 4 | 30— 0 27—11 23— 6 | 29— 4 | 30—0 | 26—10 | 27—10 | 28—10 | 29— 9 | 30-0 | |
| NOTE | .—The | are based mited by dimum allow of ela claration of the elactric wable stress wable stress | on: effection— wable deffectio sticity as not by bending str | of 1/360 or ed for "E." ength of the fibre in bend | f span length piece— ing as noted | for "f." | Dead load- Live load- | Weight of Weight of Weight of 20 pounds I | roof joist, roof sheath roof coverin | ng (2.5 pour g (8 pounds oot of roof | nds per squ i per square surface cons | are foot). foot). (Gr | oup II.) | -Weight of roof joist. Weight of roof shathing (2.5 pounds per square foot). Weight of roof covering (8 pounds per square foot). (Group II.) -20 pounds per square foot of roof surface considered as acting normal to the surface. | ace. |

RAFTER AND ROOF JOIST SPANS (30 Pound Load-Group II Covering)

RAFTER AND ROOF JOIST SPANS (40 Pound Load-Group II Covering)

| | | | M | MAXIMUM SPANS Any Slope. | 되니 | OR ROOI | F JOISTS-40 Pounds | | UNIFORMLY LOADED | OADED | | | | | |
|---|---|--|--|--|---|-------------------------|---|---|--|---|---------------------------|---|---------------------------|--|--------------------------|
| | | | MA | MAXIMUM ALL | ALLOWABLE LI | ENGTHS BI | BETWEEN S | SUPPORTS | OR FROM | PLATE TO | RIDGE | (Without Col | Collar Beams) | | |
| Size of Joists or Rafters (Nominal) in Inches | Spacing of Joists or Rafters Center to Center in Inches | Limited Having de ing code modulus inch flucture the colu | by Deflection stermined by of elasticity the species of mn below w | Limited by Deflection of 1/360 of the Span Having determined by reference to the building code or the table on page 1 the allowable modulus of elasticity in pounds per square inch for the species of timber used, refer to the column below with the corresponding | the Span the build- allowable ber square it, refer to esponding | Having fibre s | determined tress in ber a below wit | aving determined by reference to th fibre stress in bending in pounds per column below with the corresponding | nce to the unds per sq sponding va | Determined by Be the building code or r square inch for the g value to determine | | the table on page species and grade of maximum safe span. | age 1 the e of lumber | 1 the allowable extreme lumber used, refer to the | extreme: to the |
| | | value to E=1,000,000 | value to determine span., 000,000 ${f E}{=}1,200,000$ ${f E}{=}$ | value to determine span. E=1,000,000 E=1,200,000 E=1,400,000 E=1,600,000 | E=1,600,000 | f=900 | f=1,000 | f=1,100 | f=1,200 | f=1,300 | f=1,400 | f=1,500 | f=1,600 | f=1,700 | f=1,800 |
| 2 x 6 | 12 16 24 | Ft. Ins. 8—8 7—10 7—0 | Ft. Ins. 9— 4 8— 5 | Ft. Ins. 9—9 8—10 7—9 | Ft. Ins. 10— 2 9— 4 8— 2 | Ft. Ins. 9— 9 8— 7 7— 0 | Ft. Ins. 10— 4 9— 0 7— 5 | Ft. Ins. 10— 9 9— 5 7— 9 | Ft. Ins. 11— 4 9—10 8—1 | Ft. Ins. 11—9 10—2 8—5 | Ft. Ins. 12— 2 10— 7 8— 8 | Ft. Ins. 12— 8 11— 0 9— 0 | Ft. Ins. 13— 1 11— 5 9— 4 | Ft. Ins. 13—6 11—8 9—7 | Ft. Ins. 13—10 12—1 9—10 |
| 2 x 8 | 12 16 24 | 111-7-11-7-9-4 | 12— 4 11— 2 9—10 | 13-0 11-9 10-5 | 1117 | 13— 0 11— 4 9— 4 | 13 — 8 12 — 0 9 — 9 | 14— 4 12— 6 10— 4 | 15— 0 13— 1 10— 9 | 15— 7 13— 7 11— 2 | 16— 2 14— 1 11— 7 | 16— 9 14— 7 12— 0 | 17— 4 15— 1 12— 5 | 17— 9 15— 7 12— 9 | 18— 5 16— 0 13— 2 |
| 2 x 10 | 12 16 24 | 14— 7 13— 4 11— 8 | 15— 6 14— 2 12— 6 | 16— 4 14—10 13— 1 | 17— 1 15— 7 13— 8 | 16— 4 14— 4 11— 8 | 17—2 15—1 12—5 | 18 0 15 9 13 0 | 18— 9 16— 6 13— 7 | 19— 7 17— 2 14— 1 | 20— 4 17— 9 14— 8 | 21—1 18—5 15—2 | 21— 9 19— 0 15— 8 | 22— 5 19— 7 16— 2 | 23— 1 20— 2 16— 8 |
| 2 x 12 | 12 16 24 | 17— 7 16— 1 14— 2 | 18—8 17—1 15—1 | 19— 8 18— 0 15—10 | 20— 7 18— 9 16— 7 | 19— 7 17— 2 14— 2 | 20— 8 18— 1 15— 0 | 21— 8 19— 0 15— 8 | 22— 7 19— 9 16— 5 | 23 - 7 $20 - 7$ $17 - 1$ | 24— 5 21— 5 17— 8 | 25— 4 22— 2 18— 4 | 26—1 22—10 18—10 | 27— 0 23— 7 19— 6 | 27— 8 24— 4 20— 1 |
| 2 x 14 | 12 16 24 | 20— 6 18—10 16— 7 | 21—10 20— 0 17— 9 | 23— 0 21— 1 18— 7 | 24— 0 22— 1 19— 5 | 22—10 20— 0 16— 7 | 24— 0 21— 1 17— 6 | 25— 3 22— 1 18— 5 | 26— 4 23— 1 19— 5 | 27— 5 24— 1 19—11 | 28— 5 25— 0 20— 9 | 29— 5 25—11 21— 5 | 30— 0 26— 9 22— 1 | 27— 6 22—10 | 28-4 |
| 3 x 6 | 12 16 24 | 10-3 9-4 8-3 | 10—10 9—11 8—9 | 111-5 | 11—11 10—11 9— 7 | 12— 4 10—10 8—11 | 13-0 11-5 | 13—7 11—11 9—10 | 14— 3 12— 5 10— 3 | $\begin{array}{c} 14 - 10 \\ 13 - 0 \\ 10 - 9 \end{array}$ | 15— 5 13— 6 11— 1 | 15-11 $13-11$ $11-6$ | 16— 5 14— 5 11—10 | 16—11 14—10 12— 3 | 17— 5 15— 3 12— 7 |
| & X | 12 16 24 | 13— 5 12— 4 10—11 | 14-4 13-1 11-6 | 15—1 13—10 12—1 | 15— 9 14— 5 12— 9 | 16—3 14—3 11—9 | 17— 1 15— 0 12— 5 | 17—11 15— 9 13— 0 | 18 9 16 5 13 7 | 19— 7 17— 3 14— 3 | 20— 3 17— 9 14— 9 | 20—11 18— 5 15— 3 | 21— 7 18—11 15— 9 | 22— 4 19— 6 16— 3 | 22—11 20—1 16—7 |
| 3 x 10 | 12 16 24 | 16—11 15—6 13—9 | 17—11 16— 6 14— 6 | 18—11 17— 5 15— 4 | 19—10 18—1 16—0 | 20— 4 17—10 14—10 | 21— 5 18—10 15— 7 | 22— 5 19— 9 16— 5 | 23— 5 20— 7 17— 1 | 24— 4 21— 5 17—10 | 25— 4 22— 3 18— 5 | 26— 3 23— 0 19— 1 | 27— 0 23—10 19— 9 | 27—10 24— 6 20— 4 | 28— 9 25— 3 20—11 |
| 3 x 12 | 12 16 24 | 20— 4 18— 7 16— 6 | 21— 6 19—10 17— 6 | 22— 9 20—10 18— 5 | 23— 9 21—10 19— 4 | 24— 3 21— 5 17—10 | 25— 6 22— 6 18— 9 | 26—10 23— 7 19— 7 | 27—11 24— 9 20— 6 | 29— 1 25— 9 21— 5 | 30— 0 26— 7 22— 3 | 27—7 | 28— 6 23— 9 | 29— 5 | 30-0 |
| 3 x 14 | 12 16 24 | 23— 7 21— 9 19— 4 | 25— 1 23— 1 20— 6 | 26— 5 24— 4 21— 7 | 27— 7 25— 5 22— 6 | 28— 1 24—10 20— 9 | 29— 7 26— 3 21—11 | 30— 0 27— 5 22—11 | 28— 9 23—11 | 29—10 24—11 | 30— 0 25—11 | 26—10 | 27-7 | 28— 6 | 29— 4 |
| NOTE.—T | NOTE.—The lengths are based When limited by d Maximum allo Modulus of els When determined ! Allowable stree | When limited by deflection— Maximum allowable deflection of 1/860 of span length, Maximum so allowable deflection of "E.". When determined by bending strength of the piece— Allowable stress in extreme fibre in bending as noted | ion—deflection of y as noted for a strengtle extreme fibre | 1/360 of spa "E." n of the piece in bending a | for | | Dead loa | load—Weight of Weight of 1 Weight of oad—10 pounds p | roof roof roof er s | ioist. sheathing (2.5 covering (8 pc quare foot of r | pounds per so | (2.5 pounds per square foot). (8 pounds per square foot). (Group II.) of roof surface considered as acting norr | (Group II. | II.) normal to the surface. | surface. |

RAFTER AND ROOF JOIST SPANS (50 Pound Load-Group II Covering)

| | | | | MAXIM | MAXIMUM SPANS Any slope. | FOR | ROOF JOISTS Load 50 Pounds | 10 | -UNIFORMLY LOADED per Square Foot | Y LOAD | ED | | | | |
|---|--|--|---|--|--|--|--|----------------------------|---|---|--|---|-------------------------|--|-------------------------|
| | | | M | MAXIMUM ALI | ALLOWABLE LI | LENGTHS B | BETWEEN S | SUPPORTS | OR FROM | PLATE TO | RIDGE | (Without Co. | Collar Beams) | | |
| Size of Joists or Rafters (Nominal) in Inches | Spacing of Joists or Rafters Center to Center in Inches | Limitee Having of ing co ing co modult inch for the co value t | Limited by Deflection of 1/360 Having determined by reference ing code or the table on page 1 modulus of elasticity in pouncinch for the species of timber the column below with the value to determine span. | Limited by Deflection of 1/360 of the Span aving determined by reference to the building code or the table on page I the allowable modulus of elasticity in pounds per square inch for the species of timber used, refer to the column below with the corresponding value to determine span. | of the Span to the build- i the allowable ds per square used, refer to corresponding | Having fibre s | determined stress in ben n below wit | by referer nding in pou | nce to the unds per squ sponding va | Determined by Bending building code or the uare inch for the specialue to determine maxir | by Bending de or the or the specie mine maxir | Determined by Bending fibre stress in bending in pounds per square inch for the species and grade of column below with the corresponding value to determine maximum safe span. | age 1 the e of lumber | 1 the allowable extreme lumber used, refer to the | extreme to the |
| | | E=1,000,000 | 0 E=1,200,000 | 0 E=1,400,000 | E=1,600,000 | f=900 | f=1,000 | f=1,100 | f=1,200 | f=1,300 | f=1,400 | f=1,500 | f=1,600 | f=1,700 | f=1,800 |
| ST WEST | | T. | | I. | I. | Ir | Ir | II | Ir | | | II | In | I | |
| 2 x 6 | 12 16 24 | 8 -7 -7 -7 -8 -8 | 8—10 8—0 7—1 | 89— 7—7 7—5 | 9— 9 8—10 7— 9 | 9-0 7-11 6-6 | 8 8 6 9 9 | 10— 0 8— 8 7— 2 | 10— 6 9— 0 7— 6 | $ \begin{array}{c} 10 - 11 \\ 9 - 5 \\ 7 - 10 \end{array} $ | 11— 4 9—10 8— 1 | 11— 9 10— 2 8— 4 | 12— 1 10— 6 8— 8 | 12— 6 10—10 8—11 | 12—10 11— 1 9— 2 |
| 2 x 8 | 12 16 24 | 11— 0 10— 1 8—10 | 111—9 10—8 9—5 | 12— 4 11— 4 9—11 | 12—11 11— 9 10— 5 | 12-0 10-6 8-7 | 12— 8 11— 0 9— 0 | 13— 4 11— 8 9— 6 | 13—11 12—1 9—11 | 14— 6 12— 7 10— 4 | 15— 0 13— 1 10— 9 | 15— 7 13— 7 11— 1 | 16— 1 14— 0 11— 6 | 16— 7 14— 5 11—10 | 17— 0 14—10 12— 2 |
| 2 x 10 | 12 16 24 | 14— 0 12— 9 11— 2 | 14— 9 13— 6 11—11 | 15— 7 14— 3 12— 6 | 16— 4 14—10 13— 1 | 15—2 13—3 10—10 | 16— 0 13—11 11— 6 | 16— 9 14— 8 12— 0 | 17— 6 15— 3 12— 7 | 18— 3 15—11 13— 1 | 18—11 16— 6 13— 7 | 19— 7 17— 1 14— 1 | 20— 2 17— 8 14— 6 | 20—10 18— 2 15— 0 | 21— 5 18— 9 15— 5 |
| 2 x 12 | 12 16 24 | 16— 9 15— 4 13— 6 | 17—10 16— 4 14— 4 | 18— 9 17— 2 15— 1 | 19— 8 18— 0 15—10 | 18—3 15—11 13—2 | 19 - 2 $16 - 10$ $13 - 10$ | 20— 2 17— 7 14— 6 | 21— 0 18— 5 15— 2 | 21—11 19— 2 15— 9 | 22— 9 19— 9 16— 5 | 23— 6 20— 7 17— 0 | 24— 3 21— 3 17— 6 | 25— 0 21—11 18— 0 | 25— 9 22— 6 18— 7 |
| 2 x 14 | 12 16 24 | 19 - 5 $17 - 10$ $15 - 9$ | 20— 9 19— 0 16— 9 | $\begin{array}{c} 21 - 10 \\ 19 - 11 \\ 17 - 5 \end{array}$ | 22—10 20—11 18— 4 | 21— 0 18— 5 15— 3 | 22— 3 19— 5 16— 1 | 23— 3 20— 5 16—11 | 24— 4 21— 4 17— 7 | 25— 4 22— 3 18— 4 | 26— 3 23— 0 19— 0 | 27— 1 23—10 19— 9 | 28— 0 24— 7 20— 4 | 28—11 25— 4 21— 0 | 29— 9 26— 1 21— 7 |
| 3 x 6 | 12 16 24 | 9-7 8-10 7-9 | 10-3 9-4 8-3 | 10—10 9—10 8— 7 | 11— 3 10— 4 9— 0 | 11—4 9—11 8—1 | 12 10 8 7 | 12— 6 11— 0 9— 0 | 13— 1 11— 5 9— 5 | 13—7 11—11 9—10 | 14— 1 12— 4 10— 0 | 14— 7 12—10 10— 6 | 15— 1 13— 3 10—11 | 15— 7 13— 7 11— 3 | 16— 0 14— 0 11— 6 |
| % x % | 12 16 24 | 12 - 9 $11 - 9$ $10 - 3$ | 13— 6 12— 5 10—11 | 14— 3 13— 0 11— 6 | 14—11 13— 7 12— 0 | 14—11 13—1 10—10 | 15— 9 13—10 11— 5 | 16— 6 14— 6 11—11 | 17— 3 15— 1 12— 5 | 18— 1 15—10 13— 1 | 18— 7 16— 4 13— 6 | 19—4 16—11 13—11 | 19—11 17— 5 14— 5 | 20— 6 18— 0 14—10 | 21— 1 18— 6 15— 4 |
| 3 x 10 | 12 16 24 | 16 - 1 $14 - 9$ $12 - 11$ | 17 - 0 $15 - 7$ $13 - 10$ | 17—11 16— 5 14— 6 | 18—10 17— 3 15— 1 | 18—10 16— 5 13— 7 | 19—10 17— 4 14— 4 | 20—10 18— 3 15— 0 | $\begin{array}{c} 21 - 9 \\ 19 - 0 \\ 15 - 9 \end{array}$ | 22— 7 19— 9 16— 4 | 23— 5 20— 6 16—11 | 24— 3 21— 3 17— 6 | 25— 0 21—11 18— 1 | 25—10 22—7 18—9 | 26— 7 23— 3 19— 3 |
| 3 x 12 | 12 16 24 | 19— 3 17— 9 15— 7 | 20— 6 18—10 16— 7 | 21— 6 19—10 17— 6 | 22— 6 20— 9 18— 3 | 22— 5 19— 9 16— 4 | 23—7 20—10 17— 3 | 24— 9 21—10 18— 1 | 25—10 22—10 18—11 | 26—11 23— 9 19— 7 | 27—11 24— 7 20— 5 | 28—11 25— 5 21— 1 | 29—10 26—4 21—10 | 30— 0 27— 1 22— 6 | 27—11 23— 1 |
| 3 x 14 | 12 16 24 | 22— 5 20— 7 18— 3 | 23—10 21—11 19— 5 | 25— 1 23— 1 20— 5 | 26— 3 24— 1 21— 5 | $ \begin{array}{c} 26 - 0 \\ 22 - 11 \\ 19 - 1 \end{array} $ | 27— 5 24— 3 20— 1 | 28— 9 25— 5 21— 1 | 30— 0 26— 6 22— 0 | 27—7 | 28— 7 23—10 | 29— 7 | 30— 0 25— 6 | 26— 3 | 27-0 |
| NO | NOTE.—The lengths are based on: When limited by deflec Maximum allowable | gths are bas in limited by Maximum a | y deflection— Ilowable defle | lengths are based on: When limited by deflection— Maximum allowable deflection of 1/360 of span | of span length. | rth. | D | Dead load—W | -Weight of roc Weight of roc Weight of roc | of joist, of sheathing of covering | (2.5 pounds | roof joist. roof sheathing (2.5 pounds per square foot). roof covering (8 pounds per square foot). (Group II.) | re foot). | n II.) | |

Weight of roof covering (8 pounds per square foot). (Group II.) Live load—50 pounds per square foot of roof surface considered as acting normal to the surface. "f." for

Maximum allowable deflection of 1/360 of span length. Modulus of elasticity as noted for "E." When determined by bending strength of the piece—Allowable stress in extreme fibre in bending as noted f

PROPERTIES OF AMERICAN STANDARD YARD LUMBER AND TIMBER SIZES

| Size | American Standard Dressed | Area of Section | Weight per lin. foot* | Moment of Inertia | Section Modulus | Size | American Standard | Area of Section | Weight per lin. foot* | Moment of Inertia | Section Modulus |
|---|---|---|--------------------------------------|--|--|---|--|--|--|---|---|
| (Nominal | Size | A=bd. | | T_bd3 | $S = \frac{bd^2}{6}$ | (Nominal | Dressed Size | A=bd. | | , bd² | $S = \frac{bd^2}{6}$ |
| in Inches) | Inches | Sq. In. | Pounds | $I = \frac{bd^3}{12}$ | $S = \frac{1}{6}$ | in Inches) | Inches | Sq. In. | Pounds | $I = \frac{bd^3}{12}$ | $S = {6}$ |
| 2 x 4 2 x 6 2 x 8 | 15/8 x 35/8 15/8 x 55/8 15/8 x 71/2 | 5.89 9.14 12.19 | 1.6 2.5 3.4 | 6.45 24.10 57.13 | 3.56 8.57 15.32 | 10 x 20 10 x 22 10 x 24 10 x 26 | 9½ x 19½ 9½ x 21½ 9½ x 23½ 9½ x 25½ | 185.25 204.25 223.25 242.25 | 51.4 56.7 62.0 67.3 | 5870.05 7867.81 10274.06 13126.81 | 602.06 731.89 874.39 1029.56 |
| 2 x 10 2 x 12 2 x 14 | 15/8 x 9½ 15/8 x 11½ 15/8 x 13½ | 15.44 18.69 23.62 | 4.3 5.2 6.5 | 116.09 205.94 333.15 | 24.44 35.82 49.36 | 10 x 28 10 x 30 | 9½ x 27½ 9½ x 29½ | 261.25 280.25 | 72.5 77.8 | 16465.24 20323.79 | 1197.39 1377.89 |
| 2 x 16 2 x 18 2 x 20 | 15/8 x 15½ 15/8 x 17½ 15/8 x 19½ 15/8 x 19½ | 25.18 28.43 31.69 | 7.0 7.9 8.8 | 504.24 725.71 1004.05 | 65.07 82.94 102.98 | 12 x 12 12 x 14 12 x 16 12 x 18 12 x 20 | 11½ x 11½ 11½ x 13½ 11½ x 15½ 11½ x 17½ 11½ x 17½ 11½ x 19½ | 132.25 155.25 178.25 201.25 224.25 | 36.7 43.1 49.5 55.9 62.3 | 1457.50 2357.85 3568.70 5136.49 7105.90 | 253.47 349.31 460.48 586.98 728.81 |
| 3 x 4 3 x 6 3 x 8 | 25/8 x 35/8 25/8 x 55/8 25/8 x 71/2 | 9.51 14.76 19.68 | 2.6 4.2 5.7 | 10.42 38.93 92.28 | 5.75 13.84 24.60 | 12 x 22 12 x 24 | 11½ x 21½ 11½ x 23½ | 247.25 270.25 | 68.7 75.0 | 9524.24 12437.08 | 885.98 1058.47 |
| 3 x 10 3 x 12 3 x 14 | 25/8 x 9½ 25/8 x 11½ 25/8 x 13½ | 24.93 30.18 35.43 | 7.2 8.8 10.3 | 187.55 332.69 538.21 | 39.48 57.86 79.73 | 12 x 26 12 x 28 12 x 30 | 11½ x 25½ 11½ x 27½ 11½ x 29½ | 293.25 316.25 339.25 | 81.4 87.8 94.2 | 15890.42 19932.58 24602.61 | 1246.31 1449.47 1667.97 |
| 3 x 16 3 x 18 3 x 20 | 25/8 x 15½ 25/8 x 17½ 25/8 x 19½ 25/8 x 19½ | 40.68 45.94 51.19 | 11.3 12.8 14.21 | 814.60 1172.36 1622.00 | 105.11 133.98 166.36 | 14 x 14 14 x 16 14 x 18 14 x 20 | 13½ x 13½ 13½ x 15½ 13½ x 15½ 13½ x 17½ 13½ x 19½ | 182.25 209.25 236.25 263.25 | 50.6 58.1 65.6 73.1 | 2767.92 4189.36 6029.29 8341.73 | 410.06 540.56 689.06 855.56 |
| 4 x 4 4 x 6 4 x 8 | 35/8 x 35/8 35/8 x 55/8 35/8 x 71/2 | 13.14 20.39 27.18 | 3.6 5.7 7.5 | 14.38 53.76 127.44 | 7.94 19.11 33.98 | 14 x 22 14 x 24 14 x 26 | 13½ x 21½ 13½ x 23½ 13½ x 25½ | $ \begin{array}{r} 290.25 \\ \hline 317.25 \\ 344.25 \end{array} $ | 80.6 88.1 95.6 | 11180.67 14600.10 18654.04 | $\frac{1040.06}{1242.56}$ $\frac{1463.06}{1463.06}$ |
| 4 x 10 4 x 12 4 x 14 | 35/8 x 91/2 35/8 x 111/2 35/8 x 131/2 | 34.43 41.68 48.93 | 9.6 11.6 13.6 | 258.99 459.42 743.23 | 54.52 79.90 110.11 | $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$ | $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | $ \begin{array}{r} 371.25 \\ 398.25 \\ \hline 240.25 \end{array} $ | $ \begin{array}{c c} 103.1 \\ 110.6 \\ \hline 66.7 \end{array} $ | 23398.73 28881.42 4809.98 | $\frac{1701.56}{1958.06}$ $\frac{620.64}{620.64}$ |
| 4 x 16 4 x 18 4 x 20 | 35/8 x 15½ 35/8 x 17½ 35/8 x 19½ | 56.18 63.43 70.69 | 15.6 17.6 19.6 | 1124.90 1618.96 2239.88 | 145.15 185.02 229.73 | 16 x 18 16 x 20 16 x 22 16 x 24 | 15½ x 17½ 15½ x 19½ 15½ x 21½ 15½ x 21½ 15½ x 23½ | 271.25 302.25 333.25 364.25 | 75.3 83.9 92.5 101.2 | 6922.49 9577.50 12837.00 16763.00 | 791.14 982.31 1194.14 1426.64 |
| 6 x 6 6 x 8 6 x 10 | 5½ x 5½ 5½ x 7½ 5½ x 9½ 5½ x 9½ | 30.25 41.25 52.25 | 8.4 11.4 14.5 | 76.25 193.35 392.96 | 27.73 51.56 82.73 | 16 x 26 16 x 28 16 x 30 | $\begin{array}{c} 15\frac{1}{2} \times 25\frac{1}{2} \\ 15\frac{1}{2} \times 27\frac{1}{2} \\ 15\frac{1}{2} \times 29\frac{1}{2} \end{array}$ | 395.25 426.25 457.25 | 109.8 118.4 127.0 | 21417.50 26863.78 33159.98 | 1679.81 1953.64 2248.14 |
| 6 x 12 6 x 14 6 x 16 | 5½ x 11½ 5½ x 13½ 5½ x 15½ | 63.25 74.25 85.25 | 17.5 20.6 23.6 | 697.06 1127.66 1706.76 | 121.23 167.06 220.22 | 18 x 18 18 x 20 18 x 22 | 17½ x 17½ 17½ x 19½ 17½ x 21½ | 306.25 341.25 376.25 | 85.0 94.8 104.5 | 7815.73 10813.33 14493.43 | 893.23 1109.06 1348.23 |
| 6 x 18 6 x 20 6 x 22 | 5½ x 17½ 5½ x 19½ 5½ x 21½ | 96.25 107.25 118.25 | 26.7 29.8 32.8 | 2456.36 3398.46 4555.05 | 280.73 348.56 423.73 | 18 x 28 | $ \frac{17\frac{1}{2} \times 23\frac{1}{2}}{17\frac{1}{2} \times 25\frac{1}{2}} \\ \frac{17\frac{1}{2} \times 25\frac{1}{2}}{17\frac{1}{2} \times 27\frac{1}{2}} $ | 411.25 446.25 481.25 | 114.2 123.9 133.7 | 18926.02 24181.11 30331.62 | 1610.72 1896.56 2205.72 |
| 8 x 8 8 x 10 8 x 12 | 7½ x 7½ 7½ x 9½ 7½ x 11½ | 56.25 71.25 86.25 | 15.6 19.8 23.9 | 263.67 535.85 950.55 | 70.31 112.81 165.31 | $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | $ \frac{17\frac{1}{2} \times 29\frac{1}{2}}{19\frac{1}{2} \times 19\frac{1}{2}} $ $ \frac{19\frac{1}{2} \times 19\frac{1}{2}}{19\frac{1}{2} \times 21\frac{1}{2}} $ | $ \begin{array}{r} 516.25 \\ \hline 380.25 \\ 419.25 \end{array} $ | 143.4 105.6 116.4 | 37438.79 12049.49 16149.86 | $ \begin{array}{r} 2538.22 \\ \hline 1235.81 \\ 1502.31 \end{array} $ |
| 8 x 14 8 x 16 8 x 18 | 7½ x 13½ 7½ x 15½ 7½ x 17½ 7½ x 17½ | 101.25 116.25 131.25 | 28.0 32.0 36.4 | 1537.73 2327.42 3349.60 | 227.81 300.31 382.81 | 20 x 24 20 x 26 20 x 28 20 x 30 | 19½ x 23½ 19½ x 25½ 19½ x 25½ 19½ x 27½ 19½ x 27½ | 458.25 497.25 536.25 575.25 | 127.3 138.1 148.9 159.8 | 21089.04 26944.73 33798.17 41717.61 | 1794.81 2113.31 2457.81 2828.31 |
| 8 x 20 8 x 22 8 x 24 | 7½ x 19½ 7½ x 21½ 7½ x 23½ | 146.25 161.25 176.25 | 40.6 44.8 48.9 | 4634.30 6211.48 8111.17 | 475.31 577.81 690.31 | 24 x 24 24 x 26 24 x 28 | 23½ x 23½ 23½ x 25½ 23½ x 27½ | 552.25 599.25 646.25 | 153.4 166.4 179.5 | 25414.96 32471.80 40731.06 | 2162.97 2546.81 2916.97 |
| 10 x 10 10 x 12 10 x 14 10 x 16 10 x 18 | 9½ x 9½ 9½ x 11½ 9½ x 13½ 9½ x 13½ 9½ x 15½ 9½ x 17½ | 90.25 109.25 128.25 147.25 166.25 | 25.0 30.3 35.6 40.9 46.1 | 678.75 1204.01 1947.78 2948.04 4242.80 | 142.89 209.39 288.56 380.39 484.89 | 24 x 30 | 23½ x 29½ on assumed aver | 693.25 | 192.5 | 50274.98 | 3408.47 |

AVERAGE WEIGHTS OF VARIOUS MATERIALS

| (These weights were used to determine dead Finished floor. 2.5 lbs. per sq. ft. Rough floor. 2.5 lbs. per sq. ft. | loads in obtaining the span lengths in tables.) Sheathing |
|---|---|
| ROOFING Group I—Assumed as 2.5 lbs. per sq. ft. including: Shingles | Spanish the new style I part |

WHERE ADDITIONAL SPECIFIC LUMBER INFORMATION MAY BE OBTAINED

AS the publications of the National Lumber Manufacturers Association deal with lumber in general, it is suggested that those desiring additional information regarding the respective species of woods listed below should make requests for definitions, grading rules, and publications concerning the special advantages and characteristics of each species to the following member associations affiliated with the National Lumber Manufacturers Association:

CALIFORNIA REDWOOD ASSOCIATION, San Francisco, Calif.

Redwood

CALIFORNIA WHITE AND SUGAR PINE MANUFACTURERS ASSOCIATION, San Francisco, Calif.

Sugar Pine, California White Pine, White Fir, Douglas Fir, Incense Cedar

HARDWOOD MANUFACTURERS INSTITUTE, Memphis, Tenn.

Ash, Basswood, Beech, Birch, Cherry, Cypress, Chestnut, Cottonwood, Elm, Gum, Hickory, Maple, Magnolia, Oak, Poplar, Sycamore, Tupelo, Willow, Walnut, Aromatic Red Cedar

NORTH CAROLINA PINE ASSOCIATION, Norfolk, Va., and Macon, Ga.

North Carolina Pine

NORTHERN PINE MANUFACTURERS ASSOCIATION,

Minneapolis, Minn.

Northern White Pine Norway Pine, Eastern Spruce, Tamarack NORTHERN HEMLOCK AND HARDWOOD MANUFACTURERS ASSOCIATION,
Oshkosh, Wis.

Hemlock, Birch, Maple, Basswood, Elm, Ash, Beech, Tamarack, White Pine

SOUTHERN CYPRESS MANUFACTURERS
ASSOCIATION,
Jacksonville, Fla.
Cypress, Tupelo

SOUTHERN PINE ASSOCIATION,
New Orleans, La.

Longleaf and Shortleaf Southern Pine

WEST COAST LUMBERMEN'S ASSOCIATION, Seattle, Wash., and Portland, Oreg.

Douglas Fir, West Coast Hemlock, Sitka Spruce, Western Red Cedar, Port Orford Cedar

WESTERN PINE MANUFACTURERS ASSOCIATION, Portland, Oreg.

Pondosa Pine, Idaho White Pine, Larch, Douglas Fir, White Fir, Cedar and Spruce

NATIONAL LUMBER MANUFACTURERS ASSOCIATION

Transportation Building Washington, D. C.

FIELD OFFICES

New York Boston Pittsburgh Chicago Indianapolis Minneapolis Kansas City Los Angeles San Francisco New Orleans Memphis

Cooperating Organizations

British Columbia Loggers Association. British Columbia Lumber & Shingle Manufacturers Association.

Maple Flooring Manufacturers Association. National-American Wholesale Lumber Associa-

National Association of Wooden Box Manufacturers.

Oak Flooring Manufacturers Association of the United States.

Red Cedar Shingle Bureau.

Service Bureau—American Wood Preservers Association. Wood Office Furniture Associates, Inc. Tree Mark Lumber is Guaranteed



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Vol. IV.

LUMBER AND ITS UTILIZATION

Chap. VII.

Supplement to Maximum Spans for Joists and Rafters, Chapter IV.



WORKING STRESSES FOR STRUCTURAL LUMBER AND TIMBER

The economic utilization of lumber and timber demands design practices predicated on scientifically ascertained facts as to their physical and mechanical properties.

Working stresses appropriate to the qualities and characteristics of the material under its use conditions and which will allow full realization of the utility of the structural member within safe limits are provided herein for the species and grades of lumber commonly used for structural and load bearing purposes. The allowable working stresses given in Tables I, III and IV, and the safe column loads in Tables II, V and VI should be used as the basis for design with lumber unless the local building code otherwise provides.

The reference to minimum quality and the tables of allowable stresses and column loads are arranged in suitable form for inclusion in building codes and for the use of designers. The stresses given in these tables are, as indicated, either for manufacturers association Standard Commercial grades based on, or for lumber graded under, the structural grade examples given in the American Lumber Standards published by the Bureau of Standards, U. S. Department of Commerce in Simplified Practice Recommendation No. R. 16-29-Lumber - Fourth Edition. If lumber is used which is not of Association American Standard grades, or graded under the Structural grade examples, then proportionately lower stresses should be used.

NATIONAL LUMBER MANUFACTURERS ASSOCIATION Washington, D. C.

TO 90-81835 TCF

SECTION THE SIZE OF ALL WOOD STRUCTURAL MEMBERS shall be sufficient to carry the imposed loads safely and without exceeding the allowable working stresses as hereinafter specified. Where minimum sizes are required by this code, they refer to the nominal size, but in computations to determine the required size of lumber members, the net cross-section area or actual size shall be used and not the nominal size. American Standard dressed sizes shall be accepted as conforming with the corresponding nominal sizes required.

SECTION THE MAXIMUM ALLOWABLE WORKING STRESSES for lumber and timber in pounds per square inch of net cross-section area shall not exceed the values given in Tables I and II for the grades of the respective species, based on American Lumber Standards.

- (a) STRESSES FOR GRADES NOT GIVEN IN THE TABLES shall be established by the Chief Building Inspector.
- (b) STRESSES DUE TO DEAD AND LIVE LOADS, acting singly or in combination, but without wind loads, shall not exceed the allowable stress for the respective species. For stresses produced by wind loads only, or by a combination of wind loads and dead and live loads, the allowable stresses herein permitted may be increased 50% providing the resulting sections are not less than those required for dead and live loads alone.
- (c) FOR DIRECT TENSION the same values as for extreme fibre stress in bending may be used.
- (d) <u>USING THE STRESSES FOR TIMBERS</u> given in the following tables no allowance need be made for impact when the impact stress produced by any load does not exceed the live load stress.
- (e) SHEARING STRESS FOR JOINT DETAILS may, for all grades, be taken as 50% greater than the horizontal shear values otherwise permitted.
- (f) IN THE CASE OF JOISTS SUPPORTED on a ribbon board and spiked to the studding, the allowable stress in compression across the grain may be increased 50% above that specified.

SECTION THE MINIMUM QUALITY OF LUMBER AND TIMBER used structurally and for load bearing purposes shall be of commercial grades in nominal thicknesses, as follows:

- (a) STUDDING, POSTS, AND SIMILAR LOAD BEARING MEMBERS shall be not lower in grade than No. 2 Common Dimension.
- (b) BEAMS, GIRDERS, JOISTS, RAFTERS, PLANK, AND SIMILAR LCAD BEARING five inches thick shall be of a grade equal to or better than No. 1 Common Dimension.
- (c) LUMBER FIVE INCHES (5") THICK AND THICKER shall be of a grade not lower than the lowest grade for which working stresses are given in Table I.
- (d) LUMBER AND TIMBER TO BE ACCEPTED AS OF GRADES qualifying for working stresses higher than those permitted for the lowest grade provided for in Table I, shall bear an official grade mark or otherwise be identified by an acceptably authenticated certificate.

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WORKING STRESSES

All computations to determine the required sizes of lumber members should be based on the net cross-sectional area or actual size. The size of members should be sufficient to carry the imposed load safely and without exceeding the allowable working stresses given in Table I.

| | TABLE I. ALLOW | VABLE UNIT STRESS | | CTURAL LUMBER | R AND TIMBER | F1445 | |
|-------------------------------------|--|--|---------------------------------|-----------------------|--------------------------------|--------------------------------|----------------------------|
| 58/3) on one | | All Sizes, Dry | Locations | | | | |
| | | Allows | ble Unit St | ress in Pound | s per Square | Inch | |
| Species of Timber | Grade | Extreme Fibre in | | Maximum | Compre | | |
| | A STATE OF THE PARTY OF THE PAR | Joist & Plank Sizes; 4" and less in thick- | Beam & Stringer Sizes; 5" | Horizon- tal Shear | Parallel to grain (short | Perpendi- cular to grain | Modulus of Elasticit |
| | | ness | & Thicker | 00:100 124.010 | columns) | grain | Siasticie |
| Table I - A | Working Stresses for | Manufacturers A | association S | tandard Com | ercial Grades | | Lich buy |
| Douglas Fir, Coast Region | Dense Super-Structural | 2000 | 2000 | 120 | 1466 | 380 | 1,600,000 |
| | Super-Structural & Dense Structural | 1800 | 1800 | 105 | 1300 | 345 | 1,600,000 |
| | Structural | 1600 | 1600 | 90 | 1200 | 345 | 1,600,000 |
| THE RESIDENCE OF THE PARTY OF | Common Structural | 1200 | 1400 | 84 | 1100 | 325 | 1,600,000 |
| Douglas Fir, Inland Empire | *Dense Super-Structural | 2000 | 2000 | 120 | 1466 | 380 | 1,600,000 |
| | *Dense Structural No. 1 Common Dimen- | 1800 | 1800 | 105 | 1300 | 345 | 1,600,000 |
| Ref Was Indian | sion & Timbers | 1135 | 1135 | 70 | 1010 | 315 | 1,500,000 |
| Larch, Western | No. 1 Common Dimen- sion & Timbers | 1175 | 1175 | 80 | 2020 | 705 | 1 500 000 |
| Pine, Southern Yellow | Extra Dense Select | 1135 | 1135 | 70 | 1010 | 325 | 1,300,000 |
| | Structural | 2300 | 2300 | 200 | 1600 | 475 | 1,600,000 |
| | Select Structural | 2000 | 2000 | 175 | 1450 | 375 | 1,600,000 |
| | Extra Dense Heart | 2000 | 2000 | 175 | 1450 | 475 | 1,600,000 |
| | Dense Heart Structural Sq. Edge & | 1800 | 1800 | 150 | 1300 | 375 | 1,600,000 |
| | Sound | 1600 | 1600 | 125 | 1200 | 375 | 1,600,000 |
| | No. 1 Common | 1200 | 1200 | 100 | 1000 | 325 | 1.600.000 |
| Redwood | Super-Structural | 2133 | 1707 | 93 | 1422 | 267 | 1,200,000 |
| | Prime Structural | 1707 | 1494 | 82 | 1245 | 267 | 1,200,000 |
| | Select Structural | 1280 | 1322 | 70 | 1100 | 267 | 1,200,000 |
| | Heart Structural | 1024 | 1150 | 56 | 1000 | 267 | 1,200,000 |
| Table I-B | Working Stresses for Grade Ex | Structural Lumber | | | r the Structu | iral | |
| Cedar, Alaska | Select Structural | 1100 | 1100 | 90 | 800 | 250 | 1,200,000 |
| | Common Structural | 880 | 880 | 72 | 640 | 250 | 1,200,000 |
| Cedar, Northern & Southern White | Select Structural | 750 | 750 | 70 | 550 | 175 | 800,000 |
| | Common Structural | 600 | 600 | 56 | 440 | 175 | 800,000 |
| Cedar, Port Orford | Select Structural | 1100 | 1100 | 90 | 900 | 250 | 1,200,000 |
| Codem Workson Ded | Common Structural | 880 | 880 | 72 | 720 | 250 | 1,200,000 |
| Cedar, Western Red | Select Structural | 900 | 900 | 80 | 700 | 200 | 1,000,000 |
| Cypress, Southern | Sologt Structural | 720 1300 | 720 | 100 | 1100 | 200 | 1,000,000 |
| offices, Southern | Select Structural Common Structural | 1040 | 1300 1040 | 80 | 880 | 350 350 | 1,200,000 |
| Douglas Fir, Rocky Mountain Region | Select Structural | 1100 | 1100 | 85 | 800 | 275 | 1,200,000 |
| | Common Structural | 880 | 880 | 68 | 640 | 275 | 1,200,000 |
| Fir, Balsam | Select Structural | 900 | 900 | 70 | 700 | 150 | 1,000,000 |
| | Common structural | 720 | 720 | 56 | 560 | 150 | 1,000,000 |
| Fir, Golden, Noble, Silver, White, | Select Structural | 1100 | 1100 | 70 | 700 | 300 | 1,100,000 |
| (Commercial White) Hemlock, Eastern | Common Structural Select Structural | 880 1100 | 1100 | 56 70 | 700 | 300 | 1,100,000 |
| | Common Structural | 880 | 880 | 56 | 560 | 300 300 | 1,100,000 |
| Hemlock, West Coast | Select Structural | 1300 | 1300 | 75 | 900 | 300 | 1,400,000 |
| Only Commonstal With a Dat | Common Structural | 1040 | 1040 | 60 | 720 | 300 | 1,400,000 |
| Oak, Commercial White and Red | Select Structural Common Structural | 1400 | 1400 | 125 | 1000 | 500 | 1,500,000 |
| Pine, Calif., Idaho & No. White, | Select Structural | 900 | 900 | 85 | 750 | 250 | 1,000,000 |
| Lodgepole, Pondosa, Sugar | Common Structural | 720 | 720 | 68 | 600 | 250 | 1,000,000 |
| Pine, Norway | Select Structural | 1100 | 1100 | 85 | 800 | 300 | 1,200,000 |
| Campa Paul and an | Common Structural | 880 | 880 | 68 | 640 | 300 | 1,000,000 |
| Spruce, Englemann | Select Structural | 750 600 | 750 600 | 70 56 | 480 | 175 | 800,000 |
| Spruce, Red. White, Sitka | Select Structural | 1100 | 1100 | 85 | 800 | 175 | 1,200,000 |
| opinos, miles, olona | Common Structural | 880 | 880 | 68 | 640 | 250 250 | 1,200,000 |
| | | | | | | | |
| Tamarack. Eastern | | 1200 | 1200 | 95 | 1000 | | 1,300,000 |
| Tamarack, Eastern | Select Structural Common Structural | | | 95 76 | 1000 800 | 300 300 | 1,300,000 |

All Timber Columns, Posts and other vertical supports shall be of sufficient strength to safely support the combined live and dead loads transmitted to them.

Safe Loads and allowable working stresses in compression parallel to grain for timber columns shall not exceed in pounds per square inch the values given in the following table for the respective species, grade, and ratio of unsupported length to least dimension (L/d):

| | AND RECTANGULAR | TIMBER (| COLUMNS | (Dry L | ocations | 1) | | | | | | |
|--|---|------------|-------------|------------|------------|------------|------------|------------|------------|------------|------------|------|
| | | | | * | Ratio o | f Length | to Leas | t Dimens | ion (L/d |) | | |
| | the plant of the P | 10 & | L/d | L/d | L/d | L/d | L/d | L/d | L/d | L/d | L/d | L/ |
| Species of Timber | Grade | less | 12 | 14 | 16 | 18 | 20 | 25 | 30 | 35 | 40 | 5 |
| Nac a second | | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | 16 |
| Table II - A | Allowable Column Loads fo | r Manufa | cturer | s Associ | lation S | tandard | Commercia | al Grade | 6 | | | |
| Douglas fir, Coast Region | Dense Super-Str. | 1466 | 1416 | 1373 | 1307 | 1215 | 1079 | 702 | 487 | 358 | 274 | 17 |
| | Super-Str. and Dense Structural | 1300 | 1264 | 1235 | 1189 | 1123 | 1027 | 702 | 487 | 358 | 274 | 17 |
| | Structural | 1200 | 1176 | 1152 | 1112 | 1059 | 986 | 702 | 487 | 358 | 274 | 17 |
| | . Com. Structural | 1100 | 1079 | 1060 | 1032 | 992 | 937 | 702 | 487 | 358 | 274 | 17 |
| Douglas fir, Inland Empire | **Dense Super-Str. | 1466 | 1416 | 1373 | 1307 | 1215 | 1079 | 702 | 487 | 358 | 274 | 17 |
| | *Dense Structural | 1300 | 1264 | 1235 | 1189 | 1123 | 1027 | 702 | 487 | 358 | 274 | 17 |
| | No. 1 Com. Dimen. & | | | 7773 | | | 17.75 | | | | ar Vill | 1000 |
| | Timbers | 1010 | 982 | 966 | 943 | 907 | 860 | 625 | 457 | 336 | 257 | 16 |
| Larch, western | No. 1 Com. Dimen. & | 4 | | | | ENTIR EN | Bas 7 3 | | | | | |
| | Timbers | 1010 | 984 | 964 | 933 | 885 | 818 | 566 | 396 | 291 | 223 | 14 |
| Pine, Southern Yellow | Extra Dense Heart | 1450 | 1400 | 1355 | 1300 | 1195 | 1065 | 701 | 487 | 358 | 274 | 17 |
| | Dense heart | 1300 | 1265 | 1235 | 1190 | 1125 | 1027 | 701 | 437 | 358 | 274 | 17 |
| | Str. Sq. Edge & | | | | | 70.15 | NOT HOLD | | | 467462 | WALL TO | 100 |
| | Sound | 1200 | 1174 | 1150 | 1110 | 1062 | 984 | 701 | 487 | 358 | 274 | 17 |
| Redwood | No. 1 Common | 1000 | 984 | 970 | 950 | 920 | 880 | 700 | 487 | 358 | 274 | 17 |
| Hedwood | Super-Structural | 1422 | 1339 | 1272 | 1165 | 1023 | 822 | 526 | 365 | 268 | 206 | 13 |
| | Prime Structural | 1245 | 1139 | 1142 | 1073 | 971 | 822 | 526 | 365 | 268 | 206 | 13 |
| | Select Structural Heart Structural | 1100 | 1063 972 | 1029 | 979 910 | 907 858 | 307 782 | 526 526 | 365 365 | 268 268 | 206 | 13 |
| Cedar, Alaska | Select Structural Common Structural | 793 636 | 786 632 | 774 627 | 753 617 | 726 602 | 688 582 | 526 500 | 365 | 268 | 206 | 132 |
| Cedar, Northern & Southern | Select Structural | 545 | 540 | 530 | 516 | 496 | 468 | 351 | 365 | 268 | 206 | 13: |
| White | Common Structural | 437 | 435 | 430 | 423 | 412 | 398 | 338 | 244 | 179 | 137 | 88 |
| Cedar. Port Orford | Select Structural | 890 | 879 | 861 | 834 | 796 | 741 | 526 | 365 | 268 | 206 | 13: |
| | Common Structural | 715 | 709 | 700 | 686 | 667 | 639 | 521 | 365 | 268 | 206 | 132 |
| Cedar, Western Red | Select Structural | 693 | 686 | 674 | 656 | 629 | 592 | 438 | 304 | 224 | 171 | 110 |
| | Common Structural | 557 | 553 | 547 | 538 | 524 | 505 | 425 | 304 | 224 | 171 | 110 |
| Cypress, Southern | Select Structural | 1082 | 1063 | 1030 | 981 | 909 | 810 | 526 | 365 | 268 | 206 | 13 |
| | Common Structural | 870 | 861 | 843 | 818 | 781 | 729 | 526 | 365 | 268 | 206 | 13 |
| Douglas fir, Rocky Mt. Type | Select Structural | 793 | 786 | 774 | 753 | 726 | 688 | 526 | 365 | 268 | 206 | 13 |
| | Common Structural | 636 | 632 | 627 | 617 | 602 | 582 | 500 | 365 | 268 | 206 | 13 |
| Fir, Balsam | Select Structural | 693 | 686 | 674 | 656 | 629 | 592 | 438 | 304 | 224 | 171 | 110 |
| Die Germand 1 mile | Common Structural | 557 | 553 | 547 | 538 | 524 | 505 | 425 | 304 | 224 | 171 | 113 |
| Fir, Commercial White | Select Structural | 694 | 689 | 678 | 664 | 641 | 611 | 482 | 335 | 246 | 188 | 12 |
| Hemlock, Eastern | Common Structural Select Structural | 557 | 554 | 549 | 542 | 530 | 515 | 449 | 335 | 246 | 188 | 12 |
| Hamiock, Sastern. | Common Structural | 694 | 689 554 | 678 | 664 | 641 | 611 | 482 | 335 | 246 | 188 | 12 |
| Hemlock, West Coast | Select Structural | 557 893 | 885 | 549 872 | 542 | 530 | 515 | 449 | 335 | 246 | 188 | 12 |
| manufacture of the second | Common Structural | 716 | 712 | 706 | 852 696 | 823 | 783 | 614 | 426 | 313 | 240 | 15 |
| Pine, California, Idaho, and | Select Structural | 742 | 733 | 718 | 695 | 680 | 660 | 573 438 | 426 304 | 313 | 240 | 15 |
| Northern white, Pondosa, and sugar | Common Structural | 596 | 591 | 583 | 572 | 556 | 532 | 434 | 304 | 224 | 171 | 11 |
| | Select Structural | 793 | 786 | 77.4 | 753 | 726 | 6 38 | 500 | 765 | - | - | |
| Pine, Norway | Common Structural | 636 | 632 | 627 | 617 | 602 | 582 | 526 500 | 355 | 268 | 206 | 13 |
| Pine, Norway | | | | | | 530 | 494 | 351 | 365 244 | 268 | 206 | 13 |
| Pine, Norway Spruce, Englemann | Select Structural | 594 | 586 | 274 | | | | | | | | |
| GOV MARKET THE STATE OF THE STA | Select Structural | 594 476 | | 574 | 556 | | | | | | 137 | |
| Spruce, Englemann | | 476 | 473 | 466 | 457 | 444 | 426 | 347 | 244 | 179 | 137 | 8 |
| Spruce, red, white, and Sitka | Select Structural Common Structural | 476 793 | | 466 774 | 457 753 | 726 | 426 688 | 347 526 | 244 365 | 179 268 | 137 206 | 13: |
| Spruce, Englemann | Select Structural Common Structural Select Structural | 476 | 473 786 | 466 | 457 | 444 | 426 | 347 | 244 | 179 | 137 | 8 |

^{*} For columns with L/d intermediate between those which are given in this table, the safe load in pounds per square inch may be determined by interpolation.

No column shall be used with greater unsupported length than 50 times its least diameter.

²⁻¹⁵⁻³⁰

TABLE III. ALLOWABLE UNIT STRESSES FOR STRUCTURAL LUMBER AND TIMBER

(Used in Locations Occasionally Wet)

(Occasionally wet but quickly dried shall apply to use in such exterior structures as bridges, trestles, grandstands, bleachers, and exposed frame work of open sheds.)

| | Name and State of Co. | | e Unit Stress | | | | |
|---|---|--|--|----------------------------------|--|---------------------------------|--|
| Species of Timber | Grade | Extreme Fibre in Joist & Plank Sizes; 4" and less in thick- ness | Bending Beam & Stringer Sizes; 5" & Thicker | Maximum Horizon- tal Shear | Parallel to grain (short columns) | Perpendi- cular to grain | Modulus of Elasticit |
| Table III - A | Working Stresses | s for Manufacture | rs Associatio | on Standard | Commercial G | rades | 1 - 57 |
| Douglas Fir, Coast Region | Dense Super-Structural Super-Structural and Dense Structural | 1500 1400 | 1733 1560 | 120 | 1333 | 265 | 1,600,000 |
| | Structural Common Structural | 1240 980 | 1400 1200 | 90 84 | 1100 | 240 225 | 1,600,000 |
| Douglas Fir, Inland Empire | *Dense Super-Structural *Dense Structural No. 1 Common Dimension | | 1733 1560 | 120 105 | 1333 1200 | 265 240 | 1,600,000 |
| Larch, Western | No. 1 Common Dimension | 975 | | 70 | 830 | 225 | 1,500,000 |
| Pine, Southern Yellow | and Timbers Extra Dense Select | 975 | | 70 | 830 | 225 | 1,300,000 |
| | Structural Select Structural Extra Dense Heart Dense Heart Structural, Sq. Edge & Sound | 1900 1700 1700 1500 | 1900 1700 1700 1500 | 200 175 175 150 | 1450 1300 1300 1150 | 375 300 375 300 | 1,600,000 1,600,000 1,600,000 |
| Redwood | No. 1 Common Super-Structural Prime Structural Select Structural Heart Structural | 1050 1420 1182 948 805 | 1050 1422 1245 1100 960 | 93 82 70 56 | 900 1280 1120 990 900 | 250 160 160 160 160 | 1,600,000 1,200,000 1,200,000 1,200,000 |
| Table III-B | Working Stresses for S Grade Exe | Structural Lumber amples of the Ame | | | the Structu | ral | 335 |
| Cedar, Alaska | Select Structural Common Structural | 890 760 | 1000 | 90 72 | 744 597 | 200 | 1,200,000 |
| Cedar, Northern & Southern White | Select Structural Common Structural | 580 490 | 650 520 | 70 56 | 496 398 | 140 140 | 800,000 |
| Cedar, Port Orford | Select Structural Common Structural | 890 760 | 1000 | 90 72 | 818 656 | 200 | 1,200,000 |
| Cedar, Western Red | Select Structural Common Structural | 710 600 | 800 640 | 80 64 | 693 557 | 150 150 | 1,000,000 |
| Cypress, Southern | Select Structural Common Structural | 980 830 | 1100 880 | 100 | 986 7 93 | 250 250 | 1,200,000 |
| Douglas Fir, Rocky Mountain Region | Select Structural Common Structural | 800 680 | 900 720 | 85 68 | 793 636 | 225 225 | 1,200,000 |
| Fir, Balsam | Select Structural Common Structural | 670 570 | 750 600 | 70 56 | 596 478 | 125 125 | 1,000,000 |
| Fir, Colden, Noble, Silver, White, (Commercial White) | Select Structural Common Structural Select Structural | 800 630 800 | 900 720 900 | 70 56 70 | 694 557 694 | 225 225 225 | 1,100,000 1,100,000 |
| Hemlock, Eastern Hemlock, West Coast | Common Structural Select Structural | 680 980 | 720 1100 | 56 75 | 557 893 | 225 | 1,100,000 |
| Pine, Calif., Idano & No. White, | Common Structural Select Structural | 830 710 | 880 800 | 60 85 | 716 742 | 225 150 | 1,400,000 |
| Lodgepole, Pondosa, Sugar Pine, Norway | Common Structural Select Structural | 600 890 | 640 1000 | 68 85 | 596 793 | 150 175 | 1,000,000 |
| Spruce, Englemann | Common Structural Select Structural | 760 580 | 800 650 | 68 70 | 637 545 | 175 | 800,00 |
| Spruce, Red, White, Sitka | Select Structural | 490 800 | 520 900 | 56 85 | 744 | 150 | 1,200,00 |
| | Common Structural | 680 | 720 | 68 | 597 | 150 | 1,200,000 |

TABLE IV. ALLOWABLE UNIT STRESSES FOR STRUCTURAL LUMBER AND TIMBER

(Used in Locations Usually Wet)

(Usually wet or more or less continuously damp applies to use where material is exposed to waves of tide water or in contact with earth or used in a building in portions that would be more or less continuously wet)

| | 0 | | | it Stress in | | | |
|---|--|---|--|----------------------------------|--------------------------------|--------------------------------|----------------------------|
| Species of Timber | Grade | Extreme Fibre : Joist & Plank sizes; 4" and less in thick- | Beam & Stringer Sizes;5" | Maximum Horizon- tal Shear | Parallel to grain (short | Perpendi- cular to grain | Modulus of Elasticit |
| | | ness | & thicker | | columns) | | |
| Table IV - A | Working Stresses for Ma | nufacturers Asso | ciation Star | ndard Commer | cial Grades | | |
| Douglas fir, Coast Region | Dense Super-Structural | 1150 | 1333 | 120 | 1133 | 235 | 1,600,000 |
| | Super-Structural and Dense Structural | 1080 | 1200 | 105 | 1000 | 215 | 1,600,000 |
| | Structural | 950 | 1100 | 90 | 933 | 215 | 1,600,000 |
| | Common Structural | 750 | 933 | 84 | 850 | 200 | 1.600.000 |
| Daniel | * Dense Super-Structural | 1150 | 1333 | 120 | 1133 | 235 | 1,600,000 |
| Douglas fir, Inland Empire | * Dense Structural | 1080 | 1200 | 105 | 1000 | 215 | 1,600,000 |
| | 2 | 1000 | 1200 | 103 | 1000 | 210 | 1,000,00 |
| | No. 1 Common Dimension | 705 | | 70 | 655 | 200 | 1,500,000 |
| | and Timbers | 705 | | 70 | 655 | 200 | 1,500,000 |
| Larch, Western | No. 1 Common Dimension | 205 | | 70 | cee | 200 | 1 300 000 |
| | and Timbers | 705 | | 70 | 655 | 200 | 1,300,000 |
| Pine, Southern Yellow | Extra Dense Select Structur- | | | *** | 1000 | 705 | 3 600 000 |
| | al | 1500 | 1500 | 200 | 1200 | 325 | 1,600,00 |
| | Select Structural | 1300 | 1300 | 175 | 1100 | 250 | 1,600,00 |
| | Extra Dense Heart | 1300 | 1300 | 175 | 1100 | 325 | 1,600,00 |
| | Dense Heart | 1200 | 1200 | 150 | 1000 | 250 | 1,600,00 |
| | Structural Sq. Edge & | | | | | | |
| | Sound | 1100 | 1100 | 125 | 950 | 250 | 1,600,00 |
| | No. 1 Common | 800 | 800 | 100 | 800 | 200 | 1,600,00 |
| Redwood | Super-Structural | 1135 | 1138 | 93 | 1067 | 133 | 1,200,00 |
| Medwood | Prime Structural | 945 | 995 | 82 | 933 | 133 | 1,200,00 |
| | Select Structural | 758 | 880 | 70 | 825 | 133 | 1,200,00 |
| | Heart Structural | 644 | 768 | 56 | 750 | 133 | 1,200,00 |
| Table IV-B | Working Stresses for Structu | of the American | Timber Grade | d under the | Structural | | |
| Cedar, Alaska | Select Structural | 800 | 900 | 90 | 646 | 150 | 1,200,00 |
| Ceder, Alaska | | 680 | 720 | 72 | 518 | 150 | 1,200,00 |
| Coder Western & South one White | Common Structural | 530 | 600 | 70 | 447 | 100 | 800,00 |
| Cedar, Northern & Southern White | Select Structural | | | | 358 | 100 | 800,00 |
| 2.1 - 1.0.2 1 | Common Structural | 450 | 480 | 56 | | 150 | 1,200,00 |
| Cedar, Port Orford | Select Structural | 800 | 900 | 90 | 744 | | |
| | Common Structural | 680 | 720 | 72 | 597 | 150 | 1,200,00 |
| Cedar, Western Red | Select Structural | 670 | 750 | 80 | 645 | 125 | 1,000,00 |
| | Common Structural | 570 | 600 | 64 | 517 | 125 | 1,000,00 |
| Cypress, Southern | Select Structural | 800 | 900 | 100 | 793 | 225 | 1,200,00 |
| | Common Structural | 680 | 720 | 80 | 636 | 225 | 1,200,00 |
| Douglas fir, Rocky Mountain | Select Structural | 620 | 700 | 85 | 695 | 200 | 1,200,00 |
| Region | Common Structural | 530 | 560 | 68 | 558 | 200 | 1,200,00 |
| Fir, Balsam | Select Structural | 530 | 600 | 70 | 498 | 100 | 1,000,00 |
| | Common Structural | 450 | 480 | 56 | 399 | 100 | 1,000,00 |
| Fir, Golden, Noble, Silver, White | Select Structural | 710 | 800 | 70 | 596 | 200 | 1,100,00 |
| (Commercial White) | Common Structural | 600 | 640 | 56 | 478 | 200 | 1,100,00 |
| Hemlock, Eastern | Select Structural | 710 | 800 | 70 | 596 | 200 | 1,100,00 |
| | Common Structural | 600 | 640 | 56 | 478 | 200 | 1,100,00 |
| Hemlock, West Coast | Select Structural | 800 | 900 | 75 | 795 | 200 | 1,400,00 |
| | Common Structural | 680 | 729 | 60 | 637 | 200 | 1,400,00 |
| Pine, California, Idaho & Northern | | 670 | 750 | 85 | 645 | 125 | 1,000,00 |
| White, Lodgepole, Pondosa, Sugar | Common Structural | 570 | 600 | 68 | 517 | 125 | 1,000,00 |
| Pine, Norway | Select Structural | 710 | 300 | 85 | 695 | 150 | 1,200,00 |
| I amo, Horway | | | The state of the s | | | | |
| Spenier Paulous va | Common Structural Select Structural | 600 | 640 | 68 | 558 | 150 | 1,200,00 |
| Spruce, Englemann | | 440 | 500 | 70 | 447 | 100 | 800,00 |
| | Common Structural Select Structural | 370 | 400 | 56 | 358 | 100 | 800,00 |
| 2 | I Soloat Structure | 710 | 800 | 85 | 646 | 125 | 1,200,00 |
| Spruce, red, white, Sitks | | | | | | | |
| | Common Structural | 600 | 640 | 68 | 516 | 125 | 1,200,00 |
| Spruce, red, white, Sitks Tamarack, Eastern | | 600 800 680 | 900 720 | 95 | 794 | 200 | 1,200,00 |

⁵⁻⁵⁻³⁰

When graded the same as corresponding grade of Coast Region Douglas Fir

TABLE V - SAFE LOAD IN POUNDS PER SQUARE INCH OF CROSS-SECTIONAL AREA OF SQUARE AND RECTANGULAR TIMBER COLUMNS (LOCATIONS OCCASIONALLY WET)

Safe Load in Pounds per square inch of cross sectional area of square and rectangular timber columns used in Locations Occasionally Wet but Quickly Dried. This condition of use applies to exterior structures such as bridges, trestles, grandstands or bleachers and open sheds. For other conditions of use, see Tables II and VI.

| | | | | * F | Ratio of | Length t | o Least | Dimensi | on (L/d |) | | |
|---|---|-----------------------------------|-----------------------------------|-----------------------------------|----------------------------------|----------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Species of Timber | Grade | 10 & less | L/d 12 1bs. | L/d 14 1bs. | L/d 16 1bs. | L/d 18 1bs. | L/d 20 1bs. | L/d 25 1bs. | L/d 30 lbs. | L/d 35 1bs. | L/d 40 1bs. | L/d 50 lbs |
| Table V - A | Allowable Column Loads | for Man | ufacture | rs Assoc | iation S | tandard | Comme rc | al Grad | .03 | | | |
| Douglas fir, Coast Region | Dense Super-Str. Super-Str. and Dense Structural Structural | 1333 1200 1100 | 1295 1176 1079 | 1263 1152 1060 | 1214 1112 1032 | 1141 1059 992 | 986 937 | 702 702 702 | 487 487 487 | 358 358 358 | 274 274 274 | 175 175 175 |
| Douglas fir, Inland Empire | Com. Structural | 1000 | 984 | 971 | 950 | 920 | 877 | 700 | 487 | 358 | 274 | 175 |
| bougias iir, iniand smpire | **Dense Super-Str. **Dense Structural No. 1 Common Dimen- sion & Timbers | 1333 1200 830 | 1295 1176 819 | 1263 1152 810 | 1214 1112 796 | 1141 1059 776 | 1041 986 748 | 702 702 531 | 487 487 457 | 358 358 336 | 274 274 257 | 175 |
| Larch, Western | No. 1 Common Dimen- | | | | | | | | | 0.000 | | 1 |
| Pine, Southern Yellow | sion & Timbers Extra Dense Heart Dense heart Str. Sq. Edge & Sound | 1300 1150 1050 | 816 1265 1127 1029 | 805 1235 1104 1019 | 786 1190 1070 987 | 759 1125 1024 955 | 723 1027 966 903 | 701 701 703 | 396 487 487 | 291 358 358 358 | 263 274 274 274 | 142 175 175 |
| Redwood | No. 1 Common Super-Structural Prime Structural Select Structural Heart Structural | 900 1280 1120 990 900 | 888 1221 1080 963 879 | 978 1169 1046 938 861 | 862 1094 993 903 843 | 979 912 851 796 | 810 822 806 778 739 | 675 526 526 526 526 | 487 365 365 365 365 | 358 268 268 268 268 | 274 206 206 206 206 | 175 132 132 132 132 |
| Cedar, Alaska | Allowable Column I Grade Select Structural | Example 744 | 738 | 728 | zn Lumber | Standar 689 | rds 657 | 523 | 365 | 268 | 206 | 1 13 |
| Cedar, Northern & Southern White | Common Structural Select Structural | 597 496 | 594 492 | 588 485 | 581 474 | 569 459 | 552 438 | 485 348 | 365 244 | 268 | 206 | 13 |
| Cedar, Port Orford | Common Structural Select Structural | 398 | 396 808 | 392 795 | 387 774 | 379 744 | 368 702 | 323 526 | 244 365 | 179 | 137 | 8 |
| Cedar, Western Red | Common Structural Select Structural | 656 693 | 652 686 | 645 674 | 634 656 | 618 629 | 597 592 | 506 438 | 365 304 | 268 | 206 171 | 13 |
| Cypress, Southern | Select Structural | 557 986 | 553 972 | 547 947 | 538 910 | 524 856 | 505 781 | 425 526 | 304 365 | 224 | 206 | 11 |
| Douglas fir, Rocky Mt. Type | Common Structural Select Structural Common Structural | 793 | 786 786 | 773 774 | 754 753 | 726 726 | 688 | 526 | 365 365 | 268 | 206 | 13 |
| Pir, Balsam | Select Structural | 63 6 596 | 591 | 627 583 | 617 572 | 556 | 582 532 | 500 434 | 365 304 304 | 268 | 206 | 11 |
| Fir, Commercial White | Common Structural Select Structural Common Structural | 478 694 557 | 476 689 554 | 472 678 549 | 466 664 542 | 457 641 530 | 611 515 | 395 482 449 | 335 335 | 224 246 246 | 171 188 188 | 12 |
| Hemlock, Eastern | Select Structural Common Structural | 694 557 | 689 | 678 549 | 664 | 641 | 611 | 482 | 335 335 | 246 | 188 | 12 |
| Hemlock, West Coast | Select Structural Common Structural | 893 716 | 885 712 | 872 | 542 852 | 530 823 | 515 783 | 614 | 426 426 | 313 313 | 240 | 15 |
| Pine, California, Idaho and | Select Structural | 742 | 733 | 706 718 | 696 695 | 680 663 | 660 | 573 438 | 304 304 | 224 | 171 | 11 |
| northern white, Pondosa & sugar Pine, Norway | Common Structural Select Structural | 596 793 | 591 786 | 583 774 | 572 753 | 556 726 | 532 688 | 526 | 365 | 268 | 206 | 11 |
| 0 | Select Structural | 636 545 | 632 540 | 530 | 617 516 | 602 496 | 582 468 | 500 351 | 365 244 | 268 179 | 206 | 13 |
| Spruce, Englemann | | | 435 | 430 | 423 | 412 | 398 | 338 | 244 | 179 | 137 | 1 8 |
| Spruce, Englemann Spruce, red, white and Sitka | Common Structural Select Structural | 744 | 738 | 728 | 712 | 689 | 657 | 523 | 365 | 268 | 206 | |
| | Common Structural | - | | | | | 657 552 765 650 | 523 485 570 548 | 365 365 396 396 | 268 268 291 291 | 206 206 223 223 | 13 13 14 14 |

^{*} For columns with L/d intermediate between those which are given in this table, the safe load in pounds per square inch may be determined by interpolation.

No column shall be used with greater unsupported length than 50 times its least diameter.

** When graded the same as corresponding grade of coast Region Douglas Fir

TABLE VI - SAFE LOAD IN POUNDS PER SQUARE INCH OF CROSS-SECTIONAL AREA OF SQUARE AND RECTANGULAR TIMBER COLUMNS (LOCATIONS USUALLY WET)

Safe Load in Pounds per square inch of cross sectional area of square and rectangular columns used in Locations Usually Wet. This condition of use applies where material is exposed to waves of tide water or in contact with earth or where it is more or less continuously damp or wet. For other conditions of use, see Tables II and V.

| | A PROPERTY OF | - | - | _ | T , | ength to | | , 1 | , 1 | - /- 1 | - /- | 1 |
|---|---|--|--|---|--|--|---|--|--|---|--|---------------------------|
| Species of Timber | Grade | 10 & | L/d | L/d | L/d | L/d | L/d | L/d | L/d | L/d | L/d | L/ |
| | | less | 12 | 14 | 16 | 18 | 20 | 25 | 30 | 35 | 40 | 5 |
| | | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | 11 |
| Table VI - A | llowable Column Loads f | or Manuf | acturers | Associ | ation St | andard C | ommercia | al Grades | , | | | _ |
| Douglas fir, Coast Region | Dense Super-Str. Super-Str. and | 1133 | 1110 | 1087 | 1059 | 1015 | 954 | 702 | 487 | 358 | 274 | 17 |
| | Dense Structural | 1000 | 984 | 971 | 950 | 920 | 877 | 700 | 487 | 358 | 274 | 11 |
| | Structural | 933 | 920 | 909 | 891 | 867 | 833 | 689 | 487 | 358 | 274 | 1 |
| | Com. Structural | 850 | 840 | 832 | 819 | 800 | 774 | 665 | 487 | 358 | 274 | 1 |
| Douglas fir. Inland Empire | **Dense Super-Str. | 1133 | 1110 | 1087 | 1059 | 1015 | 954 | 702 | 487 | 358 | 274 | 1 |
| Jugico III, Illiand Aupiro | **Dense Structural | 1000 | 984 | 971 | 950 | 920 | 877 | 700 | 487 | 358 | 274 | 1 |
| | No. 1 Common Dimen- | | | | | | | | | | | - |
| | sion & Timbers | 655 | 651 | 645 | 638 | 628 | 615 | 561 | 453 | 336 | 257 | 1 |
| arch, Western | No. 1 Common Dimen- | 1 | | 000 | | | | | | | | |
| | sion & Timbers | 655 | 648 | 641 | 633 | 620 | 602 | 528 | 396 | 291 | 223 | 1 |
| ine, Southern Yellow | Extra Dense Heart | 1100 | 1078 | 1060 | 1034 | 990 | 935 | 701 | 487 | 358 | 274 | 1 |
| | Dense Heart Str. Sq. Edge & | 1000 | 984 | 970 | 950 | 920 | 680 | 700 | 487 | 358 | 274 | 1 |
| | Sound | 950 | 940 | 921 | 902 | 874 | 845 | 684 | 487 | 358 | 274 | 1 |
| | No. 1 Common | 800 | 792 | 785 | 774 | 758 | 737 | 650 | 487 | 358 | 274 | i |
| Redwood | Super Structural | 1067 | 1030 | 1002 | 958 | 893 | 804 | 526 | 365 | 268 | 206 | 1 |
| Vedwood | Prime Structural | 933 | 909 | 891 | 861 | 806 | 754 | 526 | 365 | 268 | 206 | li |
| | Select Structural | 825 | 808 | 796 | 772 | 744 | 701 | 526 | 365 | 268 | 206 | i |
| | Heart Structural | 750 | 738 | 727 | 711 | 687 | 657 | 520 | 365 | 268 | 206 | li |
| Cedar, Alaska | Select Structural Common Structural | 646 518 | 642 516 | 636 513 | 625 507 | 611 500 | 590 489 | 504 444 | 365 364 | 268 | 206 | 1 |
| Cedar, Northern & Southern White | Select Structural | 447 | 444 | 439 | 432 | 420 | 405 | 340 | 244 | 268 | 206 | 1 |
| odday Horencan w boddican will bo | Common Structural | 358 | 357 | 354 | 351 | 345 | 337 | 304 | 243 | 179 179 | 137 | |
| Cedar, Port Orford | Select Structural | 744 | 738 | 728 | 712 | 689 | 657 | 523 | 365 | 268 | 206 | 1 |
| | Common Structural | 597 | 594 | 588 | 581 | 569 | 552 | 485 | 365 | 268 | 206 | |
| Cedar, Western Red | Select Structural | 645 | 639 | 629 | 614 | 593 | 564 | 439 | 304 | 224 | 171 | 1 |
| | Common Structural | 517 | 514 | 510 | 502 | 491 | 476 | 412 | 304 | 224 | 171 | 1 |
| Cypress, Southern | Select Structural | 793 | 786 | 774 | 753 | 726 | 688 | 526 | 365 | 268 | 206 | 1 |
| | Common Structural | 636 | 632 | 627 | 617 | 602 | 582 | 500 | 365 | 268 | 206 | 1 |
| Douglas fir, Rocky Mt. Type | Select Structural | 695 | | | | | 625 | 518 | 365 | 268 | 206 | 1 |
| | | | 690 | 682 | 669 | 651 | | | | 200 | | |
| | Common Structural | 558 | 555 | 682 551 | 669 544 | 535 | 521 | the second secon | | 268 | 206 | 1 |
| Fir, Balsam | | | | | 1 | | 1 | 466 | 365 | 268 | 206 | |
| Fir, Balsam | Common Structural Select Structural Common Structural | 558 | 555 | 551 | 544 | 535 | 521 | 466 | 365 | 268 224 224 | 171 | 1 |
| | Select Structural | 558 498 | 555 495 | 551 490 | 544 484 | 535 474 | 521 460 | 466 404 | 365 304 | 224 | | 1 |
| | Select Structural Common Structural | 558 498 399 596 478 | 555 495 397 593 476 | 551 490 395 | 544 484 392 | 535 474 387 | 521 460 380 | 466 404 351 | 365 304 298 | 224 224 | 171 171 | 1 1 |
| Fir, Commercial White | Select Structural Common Structural Select Structural Common Structural Select Structural | 558 498 399 596 478 596 | 555 495 397 593 476 593 | 551 490 395 587 473 587 | 544 484 392 577 | 535 474 387 563 | 521 460 380 544 | 466 404 351 463 | 365 304 298 335 | 224 224 246 | 171 171 188 | 1 1 1 |
| Fir, Commercial White | Select Structural Common Structural Select Structural Common Structural Select Structural Common Structural | 558 498 399 596 478 596 478 | 555 495 397 593 476 593 476 | 551 490 395 587 473 587 473 | 544 484 392 577 468 577 468 | 535 474 387 563 461 | 521 460 380 544 451 | 466 404 351 463 409 | 365 304 298 335 334 | 224 224 246 246 | 171 171 188 188 | 1 1 1 1 |
| Fir, Commercial White | Select Structural Gommon Structural Select Structural Common Structural Select Structural Common Structural Select Structural | 558 498 399 596 478 596 478 795 | 555 495 397 593 476 593 476 790 | 551 490 395 587 473 587 473 780 | 544 484 392 577 468 577 468 766 | 535 474 387 563 461 563 461 746 | 521 460 380 544 451 544 451 718 | 466 404 351 463 409 463 | 365 304 298 335 334 335 | 224 224 246 246 246 | 171 171 188 188 | 1 1 1 1 1 |
| Fir, Commercial White Hemlock, Eastern Hemlock, West Coast | Select Structural Gommon Structural Select Structural Common Structural Select Structural Common Structural Select Structural Common Structural Common Structural | 558 498 399 596 478 596 478 795 637 | 555 495 397 593 476 593 476 790 634 | 551 490 395 587 473 587 473 780 630 | 544 484 392 577 468 577 468 766 623 | 535 474 387 563 461 563 461 746 612 | 521 460 380 544 451 544 451 718 598 | 466 404 351 463 409 463 409 598 537 | 365 304 298 335 334 335 334 426 426 | 224 224 246 246 246 246 | 171 171 188 188 188 138 | 1 1 1 1 1 |
| Fir, Commercial White Hemlock, Eastern Hemlock, West Coast Pine, California, Idano & | Select Structural Gommon Structural Select Structural Common Structural Select Structural Common Structural Common Structural Select Structural Select Structural Select Structural | 558 498 399 596 478 596 478 795 637 645 | 555 495 397 593 476 593 476 790 634 639 | 551 490 395 587 473 587 473 780 630 629 | 544 484 392 577 468 577 468 766 623 614 | 535 474 387 563 461 563 461 746 612 593 | 521 460 380 544 451 544 451 718 598 564 | 466 404 351 463 409 463 409 598 537 439 | 365 304 298 335 334 335 334 426 426 | 224 224 246 246 246 246 313 | 171 171 188 188 188 198 240 | 1 1 1 1 1 1 1 |
| Fir, Commercial White Hemlock, Rastern Hemlock, West Coast Pine, California, Idano & Northern White, Pondosa, & Sugar | Select Structural Gommon Structural Select Structural Common Structural Common Structural Common Structural Select Structural Common Structural Common Structural Common Structural Common Structural Common Structural | 558 498 399 596 478 596 478 795 637 645 517 | 555 495 397 593 476 593 476 790 634 639 514 | 551 490 395 587 473 587 473 780 630 629 510 | 544 484 392 577 468 577 468 766 623 614 502 | 535 474 387 563 461 563 461 746 612 593 491 | 521 460 380 544 451 544 451 718 598 564 476 | 466 404 351 463 409 463 409 598 537 439 412 | 365 304 298 335 334 335 334 426 426 304 304 | 224 224 246 246 246 246 313 313 3224 224 | 171 171 188 188 188 198 240 240 171 171 | 1 1 1 1 1 1 1 |
| Fir, Commercial White Hemlock, Eastern Hemlock, West Coast Pine, California, Idano & Northern White, Pondosa, & Sugar | Select Structural Gommon Structural Select Structural Common Structural Common Structural Common Structural Select Structural Common Structural Select Structural Select Structural Select Structural Select Structural | 558 498 399 596 478 596 478 795 637 645 517 | 555 495 397 593 476 593 476 790 634 639 514 | 551 490 395 587 473 587 473 780 630 629 510 | 544 484 392 577 468 577 468 766 623 614 502 | 535 474 387 563 461 563 461 746 612 593 491 651 | 521 460 380 544 451 544 451 718 598 564 476 625 | 466 404 351 463 409 463 409 598 537 439 412 | 365 304 298 335 334 335 334 426 426 304 304 | 224 224 246 246 246 246 313 313 224 224 | 171 171 188 188 188 198 240 240 171 171 206 | 1 1 1 1 1 1 1 |
| Fir, Commercial White Hemlock, Eastern Hemlock, West Coast Pine, California, Idano & Northern White, Pondosa, & Sugar Pine, Norway | Select Structural Gommon Structural Select Structural Common Structural Select Structural Common Structural Select Structural Common Structural Common Structural Select Structural Select Structural Gommon Structural Common Structural Common Structural | 558 498 399 596 478 596 478 795 637 645 517 695 558 | 555 495 397 593 476 593 476 790 634 639 514 690 555 | 551 490 395 587 473 587 473 780 629 510 682 551 | 544 484 392 577 468 577 468 766 623 614 502 669 544 | 535 474 387 563 461 563 461 746 612 593 491 651 535 | 521 460 380 544 451 544 451 718 598 564 476 625 521 | 466 404 351 463 409 463 409 598 537 439 412 513 466 | 365 304 298 335 334 335 334 426 426 304 304 365 365 | 224 224 246 246 246 246 313 313 224 224 268 268 | 171 171 188 188 188 138 240 240 171 171 206 206 | 1 1 1 1 1 1 1 |
| Fir, Commercial White Hemlock, Eastern Hemlock, West Coast Pine, California, Idano & Northern White, Pondosa, & Sugar Pine, Norway | Select Structural Gommon Structural Select Structural Common Structural Select Structural Common Structural Common Structural Common Structural Common Structural Select Structural Gommon Structural Select Structural Select Structural Select Structural Select Structural | 558 498 399 596 478 596 478 795 637 645 517 695 558 | 555 495 397 593 476 593 476 790 634 639 514 690 555 | 551 490 395 587 473 587 473 780 630 629 510 682 551 | 544 484 392 577 468 577 468 766 623 614 502 689 544 | 535 474 387 563 461 563 461 746 612 593 491 651 535 420 | 521 460 380 544 451 544 451 718 598 564 476 625 521 | 466 404 351 463 409 463 409 598 537 439 412 518 466 340 | 365 304 298 335 334 335 334 426 426 304 304 365 365 244 | 224 224 246 246 246 313 313 324 224 268 268 | 171 171 188 188 188 198 240 240 171 171 206 | 1 1 1 1 1 1 1 |
| Fir, Commercial White Hemlock, Eastern Hemlock, West Coast Pine, California, Idano & Northern White, Pondosa, & Sugar Pine, Norway Spruce, Engelmann | Select Structural Gommon Structural Select Structural Common Structural Select Structural Common Structural Common Structural Select Structural Common Structural Common Structural Common Structural Common Structural Select Structural Common Structural Common Structural Common Structural Common Structural | 558 498 399 596 478 596 478 795 637 645 517 695 558 447 358 | 555 495 397 593 476 593 476 790 634 639 514 690 555 444 357 | 551 490 395 587 473 587 473 780 630 629 510 682 551 439 354 | 544 484 392 577 468 577 468 766 623 614 502 669 544 432 351 | 535 474 387 563 461 563 461 746 612 593 491 651 535 420 345 | 521 460 380 544 451 544 451 718 598 564 476 625 521 405 337 | 466 404 351 463 409 463 409 598 537 439 412 513 466 340 304 | 365 304 298 335 334 335 334 426 426 304 304 365 365 244 243 | 224 224 246 246 246 313 313 324 224 268 268 179 179 | 171 171 188 188 188 138 240 240 171 171 206 206 | 1 1 1 1 1 1 1 |
| Fir, Commercial White Hemlock, Eastern Hemlock, West Coast Pine, California, Idano & Northern White, Pondosa, & Sugar Pine, Norway Spruce, Engelmann | Select Structural Gommon Structural Select Structural Common Structural Common Structural Common Structural Select Structural Common Structural Common Structural Common Structural Common Structural Select Structural Common Structural Select Structural Select Structural Select Structural Select Structural | 558 498 399 596 478 596 478 795 637 637 695 558 447 358 646 | 555 495 397 593 476 593 476 790 634 639 514 690 555 444 357 642 | 551 490 395 587 473 587 473 780 630 630 510 682 551 439 354 636 | 544 484 392 577 468 577 468 666 623 614 502 659 544 432 351 625 | 535 474 387 563 461 563 461 746 612 593 491 651 535 420 345 | 521 460 380 544 451 544 451 718 598 564 476 625 521 405 337 590 | 466 404 351 463 409 598 537 412 518 466 340 504 | 365 304 298 335 334 335 334 426 426 304 304 365 365 244 243 | 224 224 246 246 246 246 313 313 224 224 268 179 179 268 | 171 171 188 188 188 138 240 240 171 171 206 206 137 | 1 1 1 1 1 1 1 1 1 1 |
| Fir, Commercial White Hemlock, Eastern Hemlock, West Coast Pine, California, Idano & Northern White, Pondosa, & Sugar Pine, Norway Spruce, Engelmann Spruce, red, white & Sitka | Select Structural Common Structural Select Structural Common Structural Common Structural Common Structural Select Structural Common Structural Common Structural Common Structural Common Structural Common Structural Select Structural Common Structural Select Structural Select Structural Common Structural Select Structural Common Structural Common Structural | 558 498 399 596 478 596 478 637 645 517 695 558 447 358 646 518 | 555 495 397 593 476 593 476 639 514 639 515 444 357 642 516 | 551 490 395 587 473 587 473 780 630 629 510 682 551 439 354 636 513 | 544 484 392 577 468 577 468 623 614 502 659 544 432 351 625 | 535 474 387 563 461 563 461 746 612 593 491 651 535 420 345 611 | 521 460 380 544 451 544 451 718 598 564 476 625 521 405 337 590 489 | 466 404 351 463 409 463 409 598 537 439 412 513 466 340 304 504 | 365 304 298 335 334 335 334 426 426 304 365 365 244 243 365 365 | 224 224 246 246 246 313 313 3224 224 268 179 179 268 268 | 171 171 188 188 188 198 240 240 171 171 206 206 137 | 1 1 1 1 1 1 1 1 1 1 1 1 1 |
| Fir, Balsam Fir, Commercial White Hemlock, Eastern Hemlock, West Coast Pine, California, Idano & Northern White, Pondosa, & Sugar Pine, Norway Spruce, Engelmann Spruce, red, white & Sitka Tamarack | Select Structural Gommon Structural Select Structural Common Structural Common Structural Common Structural Select Structural Common Structural Common Structural Common Structural Common Structural Select Structural Common Structural Select Structural Select Structural Select Structural Select Structural | 558 498 399 596 478 596 478 795 637 637 695 558 447 358 646 | 555 495 397 593 476 593 476 790 634 639 514 690 555 444 357 642 | 551 490 395 587 473 587 473 780 630 630 510 682 551 439 354 636 | 544 484 392 577 468 577 468 666 623 614 502 659 544 432 351 625 | 535 474 387 563 461 563 461 746 612 593 491 651 535 420 345 | 521 460 380 544 451 544 451 718 598 564 476 625 521 405 337 590 | 466 404 351 463 409 598 537 412 518 466 340 504 | 365 304 298 335 334 335 334 426 426 304 304 365 365 244 243 | 224 224 246 246 246 246 313 313 224 224 268 179 179 268 | 171 171 188 188 188 138 240 240 171 171 206 206 137 137 | |

^{*} For columns with L/d intermediate between those which are given in this table, the safe load in pounds per square inch may be determined by interpolation.

No column shall be used with greater unsupported length than 50 times its least diameter.

^{**} When graded the same as corresponding grade of Coast Region Douglas Fir